The American Journal of Surgery

NEW SERIES, VOL. I OCTOBER, 1926 No. 4

GAS BACILLUS INFECTION. A FREQUENTLY UNNOTICED SOURCE IN CIVIL LIFE. WITH REPORT OF FOUR CASES*

I. M. GAGE, M.D.

NEW ORLEANS

WHILE gas bacillus infection has long been recognized as a prolific source of danger in war wounds, its occurrence in civil practice has until recently been largely overlooked. Its incidence under peace conditions is, however, sufficient to prompt a consideration of the subject, for unless the infection is recognized early and treated promptly the prognosis is uniformly bad.

The history[1] of gas gangrene as a clinical entity dates from 1853, when Maisonneuve first described it under the name of "gangrene foudroyante." Eleven years later the same process was described by Pirogoff as "primary mephitic gangrene" or "acute gangrenous edema." From 1871 to 1880 Bottini, Pasteur, Koch and Gaffky made it the subject of investigation, Pasteur describing the causative organism as the *vibrion septique*, and Koch and Gaffky describing the same organism, when found in human tissues, as the *bacillus of malignant edema*. In 1891 Welch and Nuttall succeeded in isolating from the human blood the bacillus which now bears the former's name and which is also familiar to us as the *bacillus aerogenes capsulatus*.

It should be clearly understood that the *bacillus Welchii*, although it is most frequently found and most often dominates the picture, is not the only anaerobe that is capable of causing this condition. It is the greatest gas-producer, but infections resulting from it alone are usually localized and self-limited because of the inhibitory influence of the gas produced. In combination with the *bacillus spirogenes*, however, which is a protein-splitter, ammonia is formed, which neutralizes the CO_2, and under these circumstances the infection rapidly advances, the symbiosis causing a very virulent type of gas bacillus infection associated with massive gangrene. Recently two organisms have been added to the group by Barney and Heller,[2] the *bacillus reglillus progrediens* and the *bacillus Meyerillus Sadowa*, but the *vibrion septique* and the *bacillus oedematiens* still remain the most virulent strains of which we have knowledge. All of these organisms behave differently in the tissues, some being saccharolytic and others proteolytic, a fact which makes it peculiarly important that the exact strain responsible shall be identified in each case of gas bacillus infection; it cannot be too strongly emphasized that the mere identification of the *bacillus Welchii* should not conclude the investigation.

These organisms are widely distributed in nature, being found as natural inhabitants of the soil, as well as in the intestines

* From the service of Dr. Urban Maes at Charity Hospital, New Orleans.

of some human beings and of most of the herbivorous animals. It would follow, then, that most of such infections would result from contamination by infected soil, or by clothing or foreign bodies that, in turn, had been contaminated by contact with the soil or with the excreta of infected animals or humans. That this is not always the case is proved by three of the cases that prompted this paper, in each of which wool in some form was identified as the responsible agent.

In a study of the sources of infection in cases 2 and 3, reported below, the shells of shotguns were investigated, since the circumstances of the accident in each case eliminated the ordinary sources. Each shell contains three wool pads interposed between the powder and shot, which are usually imbedded in the tissues whenever the wound is received from a gun fired at close range, as happened in each of these instances. Culture of the wads removed from the shells was positive in each case, and in addition, in two similar cases in which infection did not develop, culture of the wadding of the shells was also positive. Wadding from four shells not yet discharged was cultured anaerobically with identical results.

In case 4, contamination from the usual sources could also be eliminated, and as the injury was by birdshot, the explanation could not be found in the missiles themselves. After a careful inquiry as to the exact circumstances of the accident, it was discovered that the patient had just put on a practically new suit, which had in addition just been pressed, and it was decided to investigate the cloth from around the bullet holes. To our surprise the cultures were positive for *b. Welchii*. Four other samples of clothing were studied, three from patients and one from the author, with again uniformly positive results. In addition, five samples of wool cloth were obtained from a tailoring establishment and cultured anaerobically, *b. Welchii* being obtained in every instance. Litmus milk cultures were used throughout this investigation.

These uniformly positive results seem to prove quite conclusively that we have with us constantly a source of gas bacillus infection that cannot be lightly regarded, a view which is strengthened by the fact that all of these infections occur as the result of trauma, when the necessary contact with tissue is thus supplied, and that most of them occur during the winter months, when woolen clothing is universally worn. In addition, they seem to suggest that possibly the source of certain hitherto unexplained infections that have followed such simple procedures as hypodermic injections, hypodermoclysis, etc., may be contact with woolen blankets in which the patients were wrapped. In fact, Cramp has reported a case[3] of gas bacillus infection following a burn of the lower extremity about which a blanket had been wrapped, which quite evidently resulted from spores contained in the wool. It is, we admit, rather difficult to conceive that contamination which has occurred while the wool is on the sheep can be responsible months or even years later for infections of such virulence, but the facts, as we have investigated them, seem indisputable.

Since most of the organisms of the gas bacillus group grow best in muscle, it follows that there must be damage to this tissue if the necessary pabulum for their growth is to be supplied, a condition which is always met in crushing injuries, gunshot wounds and compound fractures. Moreover, in any injury which is the result of explosive violence there is always present, in addition to local devitalization of the muscles, damage to the muscles and arteries beyond the local wound. In this devitalized and injured tissue the anaerobes, introduced from some one of the sources we have named, begin to multiply and, if unchecked, rapidly extend beyond the injured tissue to the adjacent structures.

In this connection the work of Campbell

and Penefather[4] is most interesting. In studying the blood supply of muscles by roentgenograms made after the injection of bismuth into their arterial supply, they discovered that some muscles have only one blood supply, while others, especially the segmental muscles, have two or more arterial supplies. They discovered also that the circulation in any muscle is largely terminal, and that while capillaries anastomose, the larger trunks do not. These investigations make clear how easy it is for muscles to be devitalized locally with resulting interference to the blood supply from contusion of an artery or of arteries, which practically always, as Makins[5] has shown, ends in thrombosis and necrosis.

Once the organisms have gained a foothold, they begin to spread between the muscle fiber and its sheath. First a clear fluid is produced, probably highly toxic, which separates the sheath from the muscle bundles; then, as the muscle undergoes necrosis, the organisms rapidly invade the fibers themselves, producing toxins and gas with a serous exudate, the entire process rapidly interfering with the capillaries which supply the muscle fibers, because of the increased tension within the tissues. Later the larger, non-anastomosing arterioles are cut off and more muscle is devitalized because its blood supply has been interfered with. The rapidity of the process naturally depends upon the virulence of the invading organism, but a consideration of the mode of extension will show how simple it is for a purely local infection to be converted into a fulminating type which will involve all of the muscles and blood supply of an extremity, and perhaps terminate fatally.

Locally, the condition at the onset presents the usual picture of a lacerated or contused wound. If gas bacillus infection is present, some hours later there is local swelling and discoloration of the tissues, the earliest manifestations of the process, followed by a watery or sanious discharge. The tissue changes are now rapid; there is evidence of gangrene, tenseness and edema of the surrounding tissues, crepitation, and speedy extension of the process. There is mottling of the skin due to ischemia, a peculiar khaki discoloration, probably due to hemolysis, and the typical odor of decayed meat which is characteristic of *b. Welchii* infection. After gas has formed in the tissues, which is always a late symptom, bubbles may be seen issuing from the wound, and the characteristic crepitation is more pronounced. The muscles, which at first are contused and hemorrhagic, later, after the infection has become established, take on a brick-red color, which eventually changes to green and then to black as a result of the gas formation and local death. Also they do not bleed on section and they have lost their contractility on stimulation.

The hemorrhagic exudate which is sometimes seen extending beyond the infection, usually in the fascial planes, and the discoloration sometimes seen in the subcutaneous tissues in this area are not a true extension of the infectious process but rather the result of biochemical changes from the toxins, which have taken place beyond the infected area.

The systemic reaction naturally depends upon the amount of muscle damaged, as well as upon the virulence of the organism, but the majority of cases will show the same reaction, the difference being in degree rather than in kind. When the patient is first seen after the injury there is the usual clinical picture characteristic of such conditions, the degree of shock depending upon the extent of the wound. In from 6 to 12 hours the temperature begins to rise, the pulse rate is accelerated, and there is pain in and about the wound area, which gradually increases in severity. If the process is unchecked, the temperature continues to rise, the pyrexia sometimes being extreme because of the absorption of toxins liberated both by the organisms and by the disintegrated tissues,

as well as because of the absorption of the toxins of the pyogenic organisms that are always present. The tachycardia, which is a constant accompaniment of this type of infection and which is frequently out of all proportion to the pyrexia, often lasts considerably beyond the time at which the process is controlled by treatment. It is probably due to the effect on the heart muscle of the bacterial and chemical poisons which are liberated from the involved tissues. Anemia of varying degrees is practically always present, as the result of hemolysis.

Shock is always present, ranging from slight to severe, its manifestations usually appearing after the establishment of the infection, although it may have been present primarily if the wound was severe and a considerable amount of tissue was involved. Zunz[6] in his experiments with gas gangrene has explained its appearance under these circumstances as being due to the production of histamine as a result of the chemical changes that take place in the muscle. The toxemia, of course, is always marked.

A consideration of the symptoms and pathology we have just outlined will make it evident that the diagnosis of *bacillus Welchii* infection is usually a fairly simple matter, providing that the possibilities of its occurrence are borne in mind. It should always be suspected in the presence of lacerated, contused or gunshot wounds involving muscle whenever shortly afterwards there is a rising temperature and pulse rate, increased pain in the wound, and evidence of shock and toxemia, particularly if any of the sources of infection that we have mentioned are apparent. The aim, of course, should be to diagnose the condition and to institute appropriate treatment before characteristic local discoloration, swelling, crepitation and gaseous discharge have appeared, all of which are late symptoms, when the results of treatment are by no means satisfactory.

It is no more possible to lay down rigid rules for the treatment of every case of gas bacillus infection than it is to lay down rules for the treatment of any other surgical condition. Certain underlying principles hold good in every instance; after that, each case must be handled on its own merits. Our treatment of gas bacillus infection is based on certain definite facts that emerge from a study of its pathology and symtomatology:

1. The organisms are anaerobic and prefer muscle as their pabulum or culture medium.

2. They are for the most part gas-producers, and it is the distribution of this gas throughout the tissues with the resulting tension which is responsible for further devitalization of the muscle because the blood supply is interfered with.

3. If the original injury has resulted in thrombosis of the main artery of the limb, all of the muscles are immediately involved, and the infection spreads so rapidly in the culture medium thus provided that massive gangrene is an early occurrence.

4. Histamine is produced by the chemical changes that accompany the process and it is responsible for the shock, while the toxins liberated by the organisms have a depressing action on the hemopoietic system, and their hemolytic action is responsible for the anemia as well as for the other constitutional symptoms present.

A survey of these facts will make it apparent that the aim of all our treatment should be: to eliminate the devitalized tissue upon which the organisms feed; to provide free elimination for the gases produced, in order to prevent a further spread of the infection; and to institute treatment as early as possible, in order that shock and toxemia may not result from the chemical and biochemical changes that always accompany the process.

The experience of the late war has established beyond question that the wisest procedure in any contused wound is thorough débridement, particularly if the injury has involved muscle structure; and from what has been said above it will be

evident that this prophylactic measure will very largely reduce the incidence of gas bacillus infections, since it will eliminate the devitalized muscle tissue upon which the organisms must feed. Once the infection has made its appearance, prompt and bold treatment is necessary. If débridement has not already been done, it should be done immediately, the muscles being excised until there is active bleeding and contractility, which is usually definite evidence that the area of infection has been passed. It might be pointed out that this procedure will also limit absorption of toxins from the devitalized tissue, which, with the resulting production of histamine, is so largely responsible for the clinical picture of shock.

The gas formed in the tissues, which is widespread and held under tension, must be liberated thoroughly and oxygen, which has bactericidal effect on these particular organisms, must be supplied. This is best accomplished by longitudinal incisions of the muscular aponeurosis, as well as by careful separation of the muscle bundles, which will convert an anaerobic condition into an aerobic one. The incisions should always be amply large, but the tissues should be handled with the utmost gentleness, in view of the ease with which the blood supply may be injured.

After débridement and free incision we have used various types of antiseptics, including hydrogen peroxide, permanganate solution, freshly prepared dichloramin T, and the quino-formol solution* of James T. Pilcher.[7] We have used permanganate solution more often than any other preparation, and our results have been quite satisfactory, but in view of the brilliant results reported by Pilcher we intend to test his formula more extensively. He claims that the free instillation of this fluid rapidly sterilizes the entire wound and has no deleterious effect on the tissues.

*Quinine sulphate	1 gm.
Hydrochloric acid	0.50 cc.
Glacial acetic acid (99%)	5 cc.
Sodium chloride	17.50 cc.
Formol (40%)	1 cc.
Thymol	0.25 gm.
Alcohol (90%)	15 c.c.
Water up to	1 liter

Compounded by (1) dissolving the quinine in the hydrochloric and acetic acids; (2) dissolving the sodium chloride in water; (3) dissolving the thymol in alcohol; adding number 2 to number 1, then the formol, and finally the thymol solution.

The reported results of antitoxic serum have been encouraging, and the French writers are particularly enthusiastic about its effects, although we have had no personal experience with it because it cannot be obtained here. In view of the prevalence of mixed infections the polyvalent type should always be used, and it should be administered at the first manifestation of the disease, to neutralize the toxins. Immediate clinical improvement will follow if the antitoxin serum is made from the proper strains.

If the process involves all muscles of the limb and massive gangrene has set in, then the only possible procedure is amputation, but on our service we never employ it except on the strictest indications. We have found that free incision gives better results than primary amputation in those cases in which the whole limb is not involved, and the majority of recent writers on the subject are in accord with us.

The usual general measures should be employed, of course. Fluids are forced, and if enough cannot be taken by mouth, hypodermoclysis and infusion are resorted to also, a five per cent glucose solution giving particularly good results. If acidosis is present, as recent investigations would seem to indicate, then insulin might well be given with the glucose. On the first manifestation of marked hemolysis, as shown by an increasing anemia, a transfusion of whole blood should be made, the procedure being repeated as indicated. If there has been much loss of blood at the time of the original injury, or if the patient seems much shocked, it is a wise plan to resort to transfusion before any operative procedure is undertaken. Sedatives and analgesics are used as indicated,

and all possible supportive measures are invoked.

CASE REPORTS

Case 1. C. P., white male, aged 13, was admitted July 14, 1920, after a fall from a tree to the ground, which resulted in a compound fracture of the radius and ulna at the middle third, with an angular deformity. In the emergency clinic, the fracture was reduced, splints were applied, antitetanic serum was administered; and the patient was admitted to the ward with a temperature of 99.4° and a pulse of 100. On the following day there was considerable pain in the arm and evidence of poor circulation at the finger tips, so the bandage and splints were removed. The condition suggested a beginning Volkmann's ischemia with some infection. The arm was incised at the middle third and hot compresses were applied. The temperature at that time was 102°; within a few hours it had risen to 104° and the pulse was proportionately rapid.The arm soon became markedly swollen and discolored, the patient gave evidence of a profound toxemia, and death ensued early next morning, within 48 hours after admission. Just before death the temperature reached 107°. Smears and cultures taken from the wound of the forearm post-mortem were both positive for *b. Welchii*.

Note: In this case the diagnosis was not made until after death, and free incisions might have resulted in a different outcome. The infection was of the fulminating type, and was evidently introduced by contamination from the soil.

Case 2. P. R., white male, aged 27, was admitted December 4, 1921, following the accidental discharge of a gun which had resulted in a wound of the palm of the left hand and injury to the biceps muscle of the left arm about the middle third, where the shell was imbedded. In the emergency clinic the wound was opened, Dakin's tubes were introduced, antitetanic serum was administered; and the patient was sent to the ward with a temperature of 100.2° and a pulse of 103. Examination some hours later, when the patient began to complain of severe pain, showed a marked swelling of the left arm, with a large, sloughing wound at the middle third, the exposed muscles being of a brick-red color. There was also considerable swelling of the forearm, and the palm of the hand, on the ulnar side, showed an infected wound. Temperature 101°, pulse 110. Two tubes were introduced into the wound of the arm and hot permanganate compresses were applied continuously. On the following day the arm was opened wide by Dr. J. D. Rives and a large drainage tube introduced to the bottom of the wound. Twenty-four hours later Dr. Urban Maes, chief of the service, saw the patient, and operated immediately on a diagnosis of gas gangrene. Thorough débridement was done under ether anesthesia, the entire humerus being exposed on the anterior surface of the arm. Multiple longitudinal incisions were made in the forearm down through the aponeurosis, exposing the muscles, separation of which revealed gas. The wound of the hand was also débrided and rubber drains were introduced, and one through-and-through drain was inserted at the upper angle of the original wound. Hot permanganate soaks were kept on continuously for several days until granulations began to develop, after which daily irrigations of hydrogen peroxide followed by permanganate irrigations were substituted. Vaseline gauze was applied to the granulating wounds. The patient ran a low grade fever until December 10th, and the tachycardia persisted until his discharge, January 25, 1922.

Case 3. E. L., white male, aged 18, was admitted January 7, 1922, following the accidental discharge of a shotgun, which resulted in wounds of the little finger and palm of the left hand and the middle third of the left arm. In the emergency clinic the wound was cleansed and antitetanic serum was given, and a drip of permanganate solution was begun on admission to the ward. Examination by me some hours later showed a large, contaminated wound of the middle of the left arm, with laceration and contusion of the biceps muscle, which had herniated into the wound. There was some swelling, but no skin discoloration. There was also a lacerated wound of the left palm on the ulnar side, with partial amputation of the distal phalanx of the little finger. No radial or ulnar pulse could be made out. It was noted that the muscle did not bleed and that it showed no contractility when sections were taken for examination, so that the laboratory report of *b. Welchii* infection was merely a confirmation of our clinical diagnosis. Routine débridement, incision and drainage were immediately done by Dr. Maes, and the little finger was disarticulated at the second phalangeal

joint. The brachial vessels were examined during the débridement of the biceps muscle and were found to be thrombotic, which accounted for the entire absence of pulse on that side. Under routine postoperative treatment the patient improved rapidly, but the injury and subsequent retraction had resulted in so marked a loss of skin that a plastic operation was necessary and was done February 10th by Dr. Maes under local anesthesia. The results were satisfactory and the patient was discharged in good condition February 28th.

Note: In each of these cases (2 and 3) the obvious source of infection was the wadding from the shell which was imbedded in the biceps muscle. Case 3 was more extensive, but each showed typical group gangrene, and in each the laboratory report was suppurative myositis, with the culture positive for *b. Welchii*. It might be added that each of these cases illustrates the good results of conservative surgery.

Case 4. M. D., white male, aged 50, was admitted March 4, 1924, following birdshot wounds of the right forearm, arm and side. In the emergency clinic the wounds were dressed and iodinized and antitetanic serum was given. Examination in the ward the following day showed some ten widely scattered but superficial birdshot wounds on the right abdomen, with no evidence of ecchymosis or inflammation. The left forearm showed some twenty similar wounds, and there were three or four punctured wounds above the bend of the elbow on the anterior aspect, the entire wounded area thus extending from above the elbow to below the wrist. The forearm showed a mottled discoloration with areas of ischemia, and there were marked swelling and tenseness of the entire forearm. The fingers were bluish and mottled, the radial and ulnar pulses were absent, and the entire forearm and hand were cold to the touch. No crepitation could be felt in the tissues. It was decided that a subaponeurotic hematoma was probably responsible for the absence of the pulse, and on that indication operation was done by me at once under ether anesthesia. Four longitudinal incisions were made, extending from the bend of the elbow to the wrist, through the deep aponeurosis, allowing the flexor muscles to herniate into the wounds, which were left open after gentle separation of the muscles. No hematoma could be found, and although crepitation was not present, it was noted that the muscles were typically discolored and did not bleed on section, so a tentative diagnosis of *b. Welchii* infection was made, which was later confirmed by the laboratory.

Dichloramin-T dressings were applied and the wounded area was subjected to a continuous electric light bath. No improvement followed, and two days later examination showed the right hand gangrenous, the forearm greatly swollen, and crepitation in the wrist. There was some swelling above the elbow, and the lower two-thirds of the forearm showed a typical khaki discoloration. The pulse was still absent. Circular amputation was immediately done at the junction of the middle and upper third, under ether anesthesia. A marked hemorrhagic exudate was seen overlying the aponeurosis of the biceps, and the subcutaneous tissues showed some discoloration, but as the muscle bled freely and showed active contractility, this area was considered still free from infection.

Dissection of the amputated arm showed that all the muscles of the forearm were involved, as well as the biceps. The brachial artery just above the bifurcation was punctured by one shot, and was thrombosed at this point. Both radial and ulnar arteries were perforated and thrombosed, which accounted for the absence of both wrist pulses.

Recovery was uneventful. Discharged May 1, 1924, with a small granulating area at the end of the stump.

Note: In this case the clinical picture was somewhat confused owing to the fact that the gas bacillus infection developed in a field which already showed ischemic gangrene. The source of the infection was at first impossible to trace, since soil contamination could absolutely be eliminated and birdshot had caused the injury. Later, as I have already explained the source was discovered to be the woolen suit which the patient was wearing, cultures from which gave positive results, as did animal inoculation. The infection unquestionably developed because of the loss of blood supply below the elbow, which also made conservative surgery impossible.

I have since seen two cases of gunshot wounds in which the patient's clothing gave positive cultures but in which infection did not develop. The first was a wound of the pectoral region and shoulder, the second a through-and-through wound of the left leg, but in both instances the damage was slight, neither muscles nor bones were injured, there was no interference with the blood supply, and although organisms were present in the clothing, the proper conditions for their growth were not provided.

My thanks are due to Dr. Urban Maes, from whose service at Charity Hospital these cases are reported, and to Dr. Gondolph of the Charity Hospital Pathological Laboratory, who is responsible for the bacteriological studies.

Bibliography

1. Frazier. Keen's Surgery Vol. 1: 526–9. W. B. Saunders Co., 1910.
2. Barney and Heller. A detailed bacteriologic study of a case of gas gangrene following a compound fracture. *Arch. Surg.* 1922, iv, 470–84.
3. Cramp. A consideration of gas bacillus infection with special reference to treatment. *Ann. Surg.* 1912, lvi, 544–64.
4. Wallace. Keen's Surgery. Vol. vii. 80–95. W. B. Saunders Co., 1921.
5. Makins. Gunshot injuries to the blood vessels. Wm. Wood and Co., 1919.
6. Cannon. Studies in experimental shock. *Arch. Surg.*, 1922, iv, 1–22.
7. Pilcher, James T. Gas Gangrene. *Ann. Surg.*, January, 1925, lxxxi, 198.

SURGICAL TREATMENT OF CERTAIN MASSIVE BLASTOMYCOTIC SKIN LESIONS

REGINALD H. JACKSON, M.D.

MADISON, WIS.

THE two cases of blastomycotic skin lesions herewith reported present features that in my opinion warrant their designation as lesions requiring surgical intervention to increase the chance of a favorable termination. While the majority of skin lesions due to the presence and growth of the *blastomyces dermatitides* are undoubtedly amenable to the therapeutic measures of the dermatologist, in both of the cases reported the lesions had not only persisted but had become more extensive under treatment administered by eminent specialists over a period of eleven years and two years, respectively. Such a history is sufficient warrant for presenting the merits of a method that proved entirely satisfactory and resulted in a prompt eradication of the lesions without any deleterious after-effects.

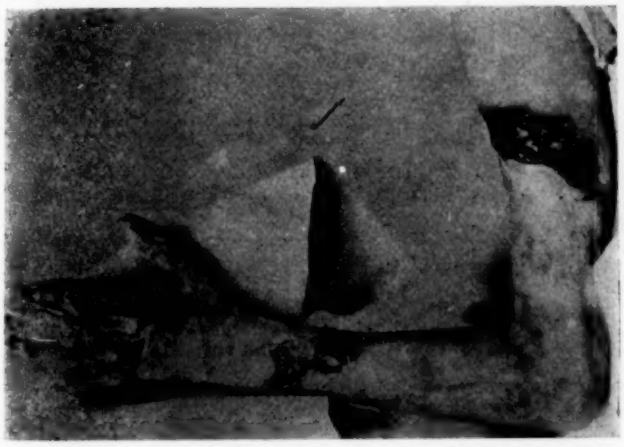

FIG. 1. Case 1. Condition of patient with blastomycosis of arm seven weeks after operation. Epithelization of cauterized area is nearly complete.

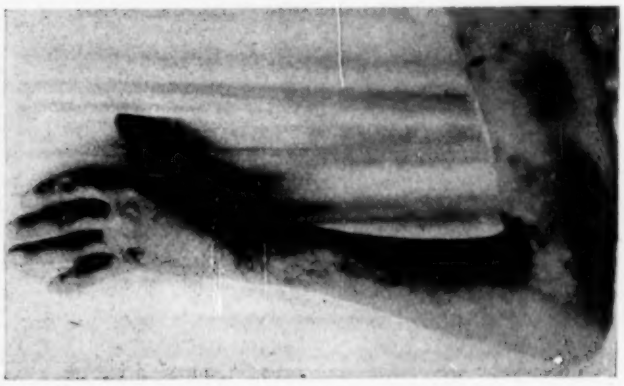

FIG. 2. Case 1. About one and one-half years after operation, showing smooth, semi-elastic condition of skin, permitting normal function of the extremity.

CASE 1 (18528). A. S., a gardener, aged 58 years, was admitted to the Jackson Clinic May 3, 1916. He had a foul ulcerating lesion involving the entire left upper extremity and was prepared to submit to amputation.

Eleven years previously he first noticed a pimple-like lesion on his left forearm. This gradually increased in size and other, similar lesions later appeared on the forearm and arm. Occasionally one of the lesions healed over but new ones continued to appear. He was under the care of many physicians and finally consulted an eminent skin specialist in Chicago who recognized the condition as blastomycosis and treated him for seven years. During this time he administered large doses of potassium iodide, excised two of the lesions and used x-ray treatments. The lesions continued to spread, however, and two years before the patient came to the Clinic he had been discharged with the opinion that nothing more could be done for him. Since then he had resignedly awaited the end, but finally determined to have the arm amputated, not with the hope of a cure but to make his existence less insufferable for the members of his family. The horrible stench that pervaded the household had resulted in its ostracism among friends and neighbors.

The patient's general health had remained good and he had recently gained in weight. He thought that the initial trouble followed a bruise on his forearm which he received while working in the garden under some rose bushes. The peculiar, foul, penetrating and nauseating stench emanating from the patient was literally overwhelming.

I have noticed a similar odor but of less intensity in other cases of blastomycosis

that have reached an advanced stage. I doubt not that if the examiner's sense of smell were properly trained through ample experience he would be able to make an accurate differential diagnosis of the various lesions due to fungi through this method of examination alone. A remarkable demonstration of this was afforded me many years ago when Dr. A. D. Bevan, while passing with me along a corridor in the hospital, stopped and sniffed the air, remarking, "Jackson, there is a case of actinomycosis near where I am standing."

Fig. 3. Case 11. Characteristic blastomycotic skin lesions of foot and forearm.

"Possibly so," I replied, "but we have no case at present." Like a pointer on a scent Dr. Bevan went back and forth and finally stopping before the door of a private room said, "It is in here." The patient in the indicated room was a woman whom I had operated on seven weeks previously for a large appendiceal abscess. The profuse and protracted drainage in this case had begun to worry me because of the possibility of a foreign body having been left in the wound. On carefully examining the discharge it was found to contain many sulphur granules which under the microscope revealed the characteristic ray fungi.

The man was fairly well nourished and without any abnormal conditions except the disease of the left upper extremity. Practically the entire extensor surface of the fingers and thumb, the back of the hand, the forearm, and the anterior and outer aspects of the upper arm were the site of a chronic blastomycotic skin lesion of the verruca type with characteristic brownish crusts with secondary pyogenic infection. There were a few scattered areas of parchment-like scar tissue where spontaneous healing had occurred. The whole extremity presented a swollen, septic appearance. Microscopic examination of the secretion revealed the characteristic blastomycotic fungi, cultures of which were successfully made by Prof. P. Clark of the bacteriologic laboratory of the University of Wisconsin.

Fig. 4. "Cootie" skin grafts to hasten epithelization.

The useless arm had been carried in a sling for several years and the patient at first would not listen to any possible method of treatment except amputation. Consent was finally obtained to have the surgeon use his judgment.

Operation was performed under general anesthesia of nitrous oxide and ether, May 6, 1916. To the entire area of the lesion, large soldering irons heated to a dull red were applied and reapplied until a thorough cooking of the tissues to a depth of about 3 or 4 mm. was assured. This cooked surface was then removed with large sharp spoon curettes, the tissues coming away in strips. The curetting was continued until blood appeared, when the irons were again applied. This method was repeated until all evidence of disease had been removed and a final application of the cautery left a lightly charred, seared surface. A hot wet dressing of one per cent copper sulphate solution was applied to the whole upper extremity.

The hot copper sulphate dressings were renewed each day until healthy granulations and epithelization appeared. Potassium iodide, 1 dram internally and, as suggested by Bevan, capsules of copper sulphate (precipitated), gr. ¼ in 3 gr., with sugar of milk were administered t.i.d. This medication was continued for periods of five days and then stopped for three days to permit the fungi, if still present, to change from the spore stage to a sprouting condition in which they are more easily destroyed.

There was no evidence at any time during convalescence of local return of the lesion.

Healthy granulations appeared after the charred surface had sloughed off and very rapid epithelization took place, aided by the application of adhesive zinc oxide plaster strips as suggested by Mathews. At the time of operation it was expected that the thorough cauterization and deep curetting would result in extensive death of the entire skin depth and that many full thickness skin grafts would be necessary to prevent permanent crippling of the arm from subsequent contractures. This apprehension was agreeably dispelled, no skin grafting whatever being necessary. About seven weeks after operation epithelization was rapidly nearing completion (figure 1). In December, 1917 when the patient returned for operation for hernia the skin was in a smooth semi-elastic condition which permitted normal function of the extremity (figure 2). There has been no evidence of recurrence at any time.

Fig. 5. Normal skin islands appearing in cauterized area.

Case II (47240). G. P., a laborer, aged 67 years, was admitted to the Clinic December 3, 1925 with foul-smelling sores on the right foot and arm.

Seventeen months previously, while he was working on a wall in an old basement, a brick fell and struck the dorsal surface of the right foot resulting in a bruise but not in an open wound. A few days later the site of the bruise was swollen and sore and the patient applied poultices for a week. At the end of this time the swelling broke open and it has never healed. One month after the appearance of the lesion on his foot a similar one appeared on the outer aspect of the right forearm. The physician who first saw it referred him to a dermatologist in Chicago under whose care he had been for the past year, taking potassium iodide and *x*-ray treatments. Both lesions have continued to increase in size and the patient has been unable to do any work for seventeen months. His general health has remained good.

Fig. 6. Epithelization on arm and foot complete.

Physical examination was negative except for the lesions on the foot and forearm which have the characteristic appearance and odor of blastomycotic infection (figure 3). Microscopic examination of the secretion confirmed this diagnosis.

Operation was performed December 4, 1925 under nitrous oxide and ether anesthesia. The same method of treatment as described in the previous case was employed. The period of convalescence was somewhat shortened by the use of adhesive plaster strips and "cootie" skin grafts (figure 4). On the dorsum of the foot several islands of new skin appeared *de novo* (figure 5), verifying the belief that even with the most thorough cauterization and curetting there is still a goodly thickness of normal skin structure left in a viable condition by this method of treatment (figure 6).

JEJUNOSTOMY

CHARLES GORDON HEYD, B.A., M.D.
Professor of Surgery
New York Post-Graduate Medical School and Hospital

MY interest in jejunostomy dates from a paper by Wm. J. Mayo in *The American Journal of the Medical Sciences*, April 1912, and a paper by Mayo Robson in the *British Medical Journal*, January 6, 1912. Since the publication of these two articles I have used jejunostomy in preference to gastrostomy and for a constantly increasing number of surgical indications. Jejunostomy is easier to perform than gastrostomy. It is essentially the simplest way to make an alimentary fistula without reflux or leakage and without cutaneous excoriation; and when the tube is withdrawn permanently no secondary operation is required to close the stoma. The operation is carried out readily under local anesthesia. In my opinion, jejunostomy has a prior place over any form of gastrostomy. Binnie states that the simplest method of doing a gastrostomy is the worst. It consists in performing an exploratory gastrotomy and suturing the stomach opening to the abdominal incision. The objection to this method is that it allows the escape of gastric contents, and all other methods for performing gastrostomy are attempts to avoid reflux and leakage.

The indications for jejunostomy are varied, depending upon the skill and predilection of the surgeon. Increasing experience with the operation shows that it has fields of usefulness heretofore unknown. We may summarize some of the conditions in which it is most successful: (1) Those conditions characterized by obstruction at any point between the mouth and stomach—esophageal stenoses, infiltrating carcinoma, cardiospasm, inoperable carcinoma of the tongue, mouth or neck. These conditions heretofore have demanded a gastrostomy as a means of artificially maintaining nutrition. I have performed jejunostomy for cardiospasm and have had the patient use the jejunostomy tube for eight months with a gain of forty-seven pounds in weight. (2) In accidental and surgical injuries to the stomach where the attempt to close the defect in that viscus is not successful. It has been my experience to have torn a large hole through an ulcerated carcinoma of the stomach and to have been unable to close the defect adequately, succeeding only in plugging the aperture with omentum and parietal peritoneum. Here my recourse was a temporary jejunostomy with splendid postoperative success. (3) In widespread ulceration of the stomach whereby complete gastric rest for a long period of time is imperative. Here jejunostomy is distinctly an adjunct to medical therapy. Certainly there are ulcerous conditions of the stomach that are beyond safe operative intervention and in which a jejunostomy with prolonged gastric rest will be either curative or diminish the infiltration in the stomach sufficiently to permit of surgical treatment at a later period. (4) To safeguard the suture integrity of gastrointestinal anastomoses. After resection of the stomach where the possibility of leakage is imminent jejunostomy offers a means of obtaining gastric rest without any danger to the future utility or function of the stomach. I have occasionally employed jejunostomy as a secondary procedure following gastoenterostomy as a means of bringing about physiological rest to the stomach and suture line. (5) In post-operative ileus and diffuse spreading peritonitis. Ileostomy as a means of draining infected intestinal loops is ordinarily not a successful procedure. The small intestine is paralyzed, overwhelming intoxication is imminent and peristalsis is reversed. Draining the most distended loop of gut somewhere near the terminal portion of the small intestine does not

meet the disturbed physiology nor the mechanical conditions of paresis. One has only to recall the beneficial effect of repeated gastric lavage in intestinal obstruction and in general peritonitis to realize that the mechanical factor which necessitates gastric lavage is a reflux of intestinal material into the stomach. Jejunostomy provides drainage for the small intestine and is an operation that is indicated in intestinal obstruction with marked distention where the problem is to prevent death from overwhelming intestinal toxemia and the relief of the obstruction is a secondary consideration. Jejunostomy can be performed under local anesthesia in those grave conditions where general anesthesia, even by nitrous oxide gas, should not be induced on account of the paralyzing effect that it has upon intestinal motility. (6) In perforating gastro-duodenal ulcer where some doubt may be entertained as to the firmness of the closure of the perforation, jejunostomy is a simpler operation than gastroenterostomy and one that can be accomplished in one-quarter of the time required for the latter. (7) As a preliminary to resection or excision of the larynx jejunostomy is indicated and should be performed at the same time as tracheotomy.

The operation is easily performed through an incision about three inches long, midway between the umbilicus and the costal margin and about one inch to the left of the median line. The fibers of the rectus muscle are separated and, before entering the peritoneal cavity, the edges of the wound are protected from intestinal contamination by gauze pads. The peritoneal cavity is then opened and the transverse colon with its omentum are identified. By lifting the transverse colon upward and to the right the under surface of the mesocolon is exposed and the beginning of the jejunum is accurately determined. The jejunum commences at the fixed duodeno-jejunal flexure and passes downward and to the left. This is the anatomical arrangement in about ninety-five per cent. of all abdomens but it is well to remember that in five per cent. the jejunum arises to the right of the vertebral column. There are other landmarks for identifying the first portion of the jejunum but this method is after all the simplest and the best. In cases of diffuse peritonitis it is sometimes extremely difficult to determine the first portion of the small intestine because of the distention of the bowels and the forcing up of the transverse colon and upper intestine under the costal dome. In these cases, McKinnon has pointed out that the first portion of the jejunum may be picked up by introducing the index finger and locating the bifurcation of the abdominal aorta. The beginning of the jejunum is normally an inch above it and slightly to the left. It is important to determine the direction of the jejunal loop. Under ordinary circumstances this is easily done by sight and by making the first portion of the jejunum taut and following the direction of the gut toward the ileum. In conditions of marked distention, such as occurs in peritonitis or intestinal obstruction, the identification of the direction of intestinal current may be a matter of the greatest difficulty. The value of peristalsis in indicating the direction of a loop is not reliable even when it is present. The best maneuver to accomplish identification under such circumstances is to locate the upper or superior surface of the mesentery of the jejunum. By passing the thumb of the left hand down on one side of the mesentery and the index and middle fingers on the other side the direction of the mesentery can ordinarily be determined readily. Palpation between the thumb and forefingers will make clear the line of mesenteric insertion and disclose any twists in the mesentery itself. If there are any twists the loop of gut is arranged so as to parallel the line of its mesenteric attachment and this will aways leave the upper end of the loop proximal and the lower end distal as it should be in every normal case.

After the jejunum has been identified a point is selected about fifteen inches from the duodeno-jejunal flexure; and exactly opposite to the mesentery an Allis forceps is applied. The length of jejunum between the Allis forceps and the duodenum will be enough to allow a gradually sloping loop to run from the base of the meso-colon up to the incision in the anterior abdominal wall without tension or traction. It is at this point that the jejunostomy tube is introduced. About two inches on either side of the Allis forceps the jejunum is compressed between rubber covered clamps so as to prevent any intestinal leakage from either the proximal or the distal segment. A pursestring suture of No. 1 chromicized catgut is placed around the Allis forceps so as to enclose a circular portion of the bowel about the size of a twenty-five cent piece. An open loop is left in the purse-string at the midpoint exactly opposite its beginning and ending. This loop is left long for the purpose of facilitating inversion. The Allis forceps is now removed and one Allis clamp is applied on each side—superior and inferior surface of the bowel—just below the purse-string suture for the purpose of holding the jeunum. An incision one centimeter in length is made in the exact center of the area of bowel enclosed by the purse-string and a No. 28 French soft rubber catheter is introduced into the jejunum. The end of the catheter is cut obliquely and has two apertures in the distal two inches. The catheter is passed about three inches into the jejunum and is then transfixed with No. 2 chromicized catgut and tied in place. Upon holding the open loop of the purse-string in the little finger of the left hand and the entering and leaving ends of the thread of the purse-string between the thumb and index finger of the same hand, the tube is thrust down and into the bowel with the right hand, carrying with it a portion of the jejunum, producing thus a serosal inversion. Upon tying the purse-string an ample collar of peritoneum surrounds the inverted tube much after the fashion of the inversion of the tube in a Kader gastrostomy.

The next step in the operation is to infold a portion of the tube below and above the purse-string, using a needle swedged onto a No. 1 chromicized catgut suture and employing a right angle Cushing stitch after the method of Witzel. This right angle Cushing suture begins about three centimeters below and continues about three centimeters above the point of inversion of the tube, the tube itself lying in a "trough" of the jejunum. The rubber covered compression clamps are removed as well as the two Allis forceps. The omentum is brought down and around the tube either by perforating it and bringing the tube out through the omental aperture or, as I prefer to do it, by folding the omentum around the tube and over the suture line. The tube is brought out of the abdomen at the lower angle of the wound and the abdominal wall is closed in the usual fashion. A small drain of rubber tissue is inserted at the lower angle of the wound in order to take care of any possible infection of the subcutaneous fatty tissue.

Postoperative Treatment. So far as the operation is concerned the postoperative treatment is extremely simple. All food and fluids by mouth are withheld although there is no objection to allowing the patient to moisten the buccal membranes with a very small quantity of water. For the first twelve hours there is administered a continuous Murphy proctoclysis consisting of tap water 1000 c.c., glucose 100 grams, soda bicarbonate 20 grams. In order to overcome more quickly the fluid loss that is present it is advisable to give at least a 1000 c.c. of water by rectum two or three times a day for a week or ten days. A fifth of a grain of morphine is given hypodermatically every four hours, or as the occasion demands, for pain or restlessness. The patient is placed in a slight Fowler position and may sit up out of bed at the end of a week and be able to leave the hospital

in ten or twelve days when he has become thoroughly familiar with the technic of feeding himself through the tube.

Through the tube we may safely introduce fluid into the jejunum every two or three hours. I prefer to let the material run into the tube through a funnel by gravity rather than to introduce it by means of a syringe. Therefore any fluid or semi-fluid food material may be utilized. Occasionally, and for a few days only, there is a slight peritoneal reflex in the form of nausea if the feeding is given in too large a quantity or is introduced too rapidly into the jejunum. This passes away quickly and then as much as eight, ten or twelve ounces may be given readily at each feeding.

JEJUNOSTOMY PORTIONS

	Proteid	Fats	Carbohydrates	Calories
1. Orange juice, 6 oz.	.....	.....	10	40
2 Cream of wheat, 4 tablespoonfuls	4	2	24	135
Butter, pat or ball	.....	8.5	..	80
Cream, 2 tablespoonfuls	1	12	1	120
Milk, 2 tablespoonfuls	2	2.5	3	40
3. Two eggs	13	10	..	150
4. Cocoa, 6 oz.	20	30	36	500
5. Milk, 1 glass, 8 oz.	7.5	9.5	12	160
Lactose, 4 teaspoonfuls	.....	.....	25	100
6. Soup, thick, creamed, 8 oz.	5.5	4.5	24	160
Butter	.....	8.5	..	80
7. Rice, milk, cream and sugar	10	12	80	450
8. Custard	6	5	12	120
9. Chocolate, 6 oz.	13	48	10	600
10. Puddings	4	5	30	170
Bread				
Rice				
Cornstarch				
11. Ice cream, 2 tablespoonfuls	3	18	22	275
12. Whiskey (50 per cent alcohol) 1 oz.	.....	.....	..	85
13. Wines (8 to 25 per cent alcohol) 1 oz.				15–50
14. Gruels, cereal, 8 oz.	2.5	1	14	75

For the purpose of restoring the patient to a nearly normal nutrition it is necessary for the time being to exceed his ordinary caloric requirements and it is also desirable not to go above 100 grams of protein, 185 grams of fat or 500 grams of carbohydrates. The patient may remove the tube between feedings; and if it is reintroduced within ten or twelve hours there will be no difficulty in doing so.

For the convenience of hospital routine we divide the diet into portions and on the chart is the approximate amount in grams of proteins, fats and carbohydrates, with their caloric equivalents in each portion. These are approximate values only and serve to indicate in a general way the dietary requirements. By the addition of lactose to each feeding or by occasionally adding sherry or by concentrating the mixture with equal parts of cream and milk a very high caloric diet may be obtained.

The jejunostomy feeding schedule for an individual case may be made up as follows:*

7 a.m., Arising
Water, one glass, 6 oz.
20 minutes later, orange juice, 6 oz.
Cream of Wheat, etc.
9 a.m.
Two eggs, soft boiled, egg-nog
Glass of milk and lactose
11 a.m.
Soup
Butter
1 p.m.
Cocoa
2 p.m.
Water, one glass
4 p.m.
Rice, cream
Sugar, milk
6 p.m.
Water, one glass
7 p.m.
Cereal
9 p.m.
Milk and lactose
10 to 11 p.m.
Chocolate
Water,* one glass

This dietary contains 92 grams of protein, 182 grams of fat and 310 grams of

* Water may be taken at any time. For the first week a considerable quantity should be given between regular feedings in order to overcome the dehydration that is almost always present.

carbohydrates, representing a total of 3250 calories. By adding to this schedule egg nogs, sherry, lactose, honey or Karo syrup, the caloric total may be greatly increased with no increase in the fats and only a slight increase in proteins. A diet along the above lines will allow a gain in weight, will ordinarily be well digested and assimilated, and will easily meet the nutritional requirements of the individual.

THE TWO CLAMP METHOD OF REMOVING HEMORRHOIDS. A NEW AND SIMPLE PROCEDURE

T. L. DEAVOR, M.D., F.A.C.S.

SYRACUSE, N. Y.

HEMMORRHOIDS may be classified under three heads: (1) external (2) internal and (3) externo-internal, or a combination of the first two (figures 1 and 2). All three forms may be present in the same individual, but usually are not. One may find: only a single pile; usually three; sometimes five; rarely seven (figures 2 and 3). An associated prolapse of the mucous membrane is not uncommon (figure 3). Small tabs of skin, and varicosities, frequently seen about the anal region, are really not hemorrhoids, even though extirpation is necessary. The so-called sentinel pile is apt to be small, and marks the lower extremity, or beginning, of a fissure, which is usually anterior or posterior rather than lateral. Fissure and ulcer are the two most common complications of hemorrhoids, both of which respond to treatment much better if the sphincter is first dilated.

Some do not sharply differentiate between fissure and ulcer, since the treatment is much the same in each instance. The two conditions hardly ever occur together. Fistula is occasionally met with hemorrhoids, and a small percentage of hemorrhoids are tuberculous.

Hemorrhoids may be very small and painful; or very large and painless. They may become strangulated, inflamed or gangrenous. Piles have been known to slough away and heal, or, having reached a high degree of tension, causing almost unbearable distress, to rupture and disappear without recurrence. All these things should be carefully considered before operative treatment is decided upon. Whether one should remove hemorrhoids during an acute attack, depends upon the gravity of the case. Usually it is better to reduce the inflammation by rest and palliative measures, before operating. There are certain general diseases in which piles come on as a mere coincidence, or a natural sequence. In some of these cases operative treatment of the rectal condition is required, to relieve pain and inconvenience, although the primary ailment is entirely unaffected thereby.

No matter which particular operation is chosen for the treatment of hemorrhoids, in a given case, one should consider carefully the pathology in each instance, and the symptoms complained of, in order that he may satisfy the patient's expectation. Many patients complain of pain, though the piles never protrude. Others are alarmed at the mere sight of hemorrhage. Itching may be the only symptom that brings the patient to the physician. Some tire of replacing one or more piles after each defecation, although there is little or no discomfort. Quite a few patients apply for treatment because of small tabs or nodules about the anus. The all-important thing, therefore, is to relieve the patient of the symptom that is uppermost in his mind. If this is not done, the operation will be a complete failure to the patient, even though the work is wholly satisfactory to the surgeon.

Of all the operative procedures for the relief of hemorrhoids, the most popular is by the clamp and cautery. It is easily carried out and, in the main, quite satisfactory. Serious hemorrhage, and even fatal embolism, has followed the employment of this method, however. Ligation and excision comes next, and is used by many surgeons. So far as hemorrhage is concerned, it is safer than the clamp and cautery. It is not as accurate in its application, however, since without clamp fixation, it is more difficult to define the amount of tissue to be removed. Often

some of the pile mass is left, and the mucous membrane of the rectum is more widely contused. Pain, swelling and inflammatory reaction are also more pronounced.

There are many modifications of the ligation method, which need not be defined here. I have used the clamp and cautery, the purse-string with excision, as well as ligation and excision of the central mass with closure of the mucous membrane and all with very pleasing results. When, for some reason, it is not desirable to remove a thrombotic mass, incision and turning out of the clot is sufficient. The wound should be kept clean until fully healed. All forms of injection are attended by a certain amount of danger. I do not use them. The Whitehead operation is a grave uncertainty. The mucous membrane higher in the bowel cannot always adapt itself to the anorectal region. Union is not usually regular and complete, and the operator must be prepared to deal with excessive hemorrhage.

During the past two years, I have practiced what I call the "two-clamp method," and the outcome has been so satisfactory to both the patient and myself, that I thought the procedure might be of sufficient interest to justify its publication. The reason for the name "two-clamp method," is set forth in the description that follows.

After the usual preparation, with the patient in the lithotomy position, under local or general anesthesia, the entire field is gone over, using a speculum if desired, to determine the number and location of the pile tumors, and the presence or absence of complications. The sphincter is then slowly dilated, and the piles to be removed are again identified. A clip is attached to the summit of each pile mass, as a marker, since much confusion is apt to arise from rapid swelling and eversion of the mucous membrane after divulsion.

The first clamp, straight or curved, as the case requires, is then applied to the base of a pile, in the long axis of the bowel, much as in gastroenterostomy (figure 4, a). The clamp is locked, but not tight,—merely enough to prevent hemorrhage, yet give sufficient fixation. This is a safegard against embolism. The clamp is put on

Fig. 1. *a*, External hemorrhoids. They are congested and painful. The contracted sphincter has cut off the return circulation. These cases respond very favorably to operation.

Fig. 2. *a*, Internal, *b*, externo-internal hemorrhoids. Both forms protruding. This cut illustrates that pile tumors often appear in groups of three, five or seven. A solitary pile, unassociated with fissure, is rather rare. (Modified from Gant.)

close to the surrounding wall of the rectum, but it must not include the deeper structures. If it slides readily from side to side, the pile mass, and not the rectal wall, is properly held. A medium length slender clamp is desirable (figure 5). If the hemorrhoid is wholly external or purely internal, a straight clamp is used. If it is externo-internal, or thrombotic, and lies on both sides of Hilton's line, a curved clamp, concavity outward, will serve best.

Having placed the first clamp so as to include accurately and completely the part to be removed, the second clamp, straight or curved, is applied, close against the first, and closed tight, forming a pedicle (figure 4, b). With scissors or knife, the mass is quickly cut away, down to the second clamp.

The second clamp is now removed, and the pedicle thus revealed is whipped over with a fine catgut suture, from one extremity to the other, and back again, tying to the short end left. Removal of the first clamp completes the work (figure 4, c). There is little or no oozing. Should hemorrhage appear likely at any point, two or three interrupted sutures carried under, and tied over, the running stitch will make further bleeding impossible. Remaining piles are dealt with in the same way. The technic is varied to suit unusual conditions.

It is highly important to excise all the offending members of the group, and yet not compromise the rectal mucous membrane too extensively. Small nodules will usually disappear, by a process of restitution, after two or three larger ones have been removed (figure 3). An ulcerated area may be curetted or closed by suture after excision. This, with functional rest from dilatation of the sphincter, will usually suffice. If a fissure is present, its base should be incised full length and all unhealthy granulations cleared away. A small break in the mucous membrane, due to stretching of the sphincter, must not be mistaken for a true fissure (figure 6).

The field is cleansed and dressed, and the patient is put to bed. Neither tube nor gauze is left in the rectum. It is well to examine all excised tissue as a checkup against tuberculosis or malignancy. The part is kept clean with a five per cent.

Fig. 3. Engorged internal hemorrhoids with prolapse of the mucous membrane, often seen as a complication. Not all the pile tumors here shown should be removed, lest constriction of the rectum follow. After excision of the larger hemorrhoids, the two smaller ones and the prolapse of the mucous membrane will disappear by a process of restitution.

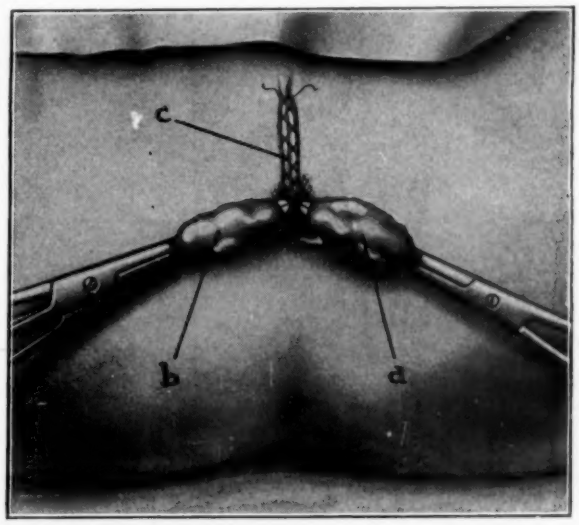

Fig. 4. *a*, First clamp applied, close to surrounding structures, so as to include the entire pile mass. *b*. Second clamp in place, and closed tightly, ready for excision of tissue. *c*, Tissue cut away, pedicle whipped over and first clamp removed. This completes the work.

carbolic acid solution. This also acts as a sedative. Hot compresses made from the same solution are excellent for the control of soreness and smarting, which are complained of during the early postoperative oeriod. Morphine may be required. If opium suppositories are used belladonna should be left out, since it frequently makes catheterization necessary, and this is undesirable. The bowels are moved on the third day, by an enema, if defecation has not already taken place. Thereafter, they should act daily or every other day; and the area is kept clean as before. The patient stays in bed three to seven days, often much longer, depending upon the gravity of the case. He should be under more or less observation until healing is complete and a final examination indicates that the work is entirely satisfactory. Careful advice as to habits of living should not be overlooked.

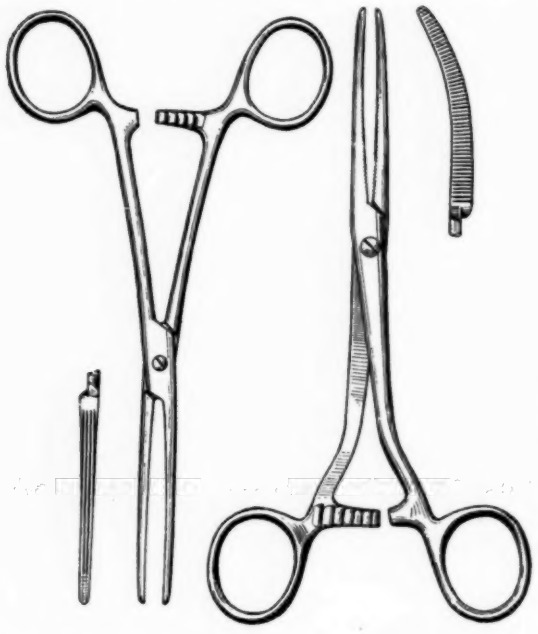

Fig. 5. Instruments used in the "two-clamp" operation for hemorrhoids. Almost any slender pedicle clamp will do.

Moderate or severe secondary hemorrhage may follow any hemorrhoid operation. With this method it is quite unlikely, however, as will be evident to the operator. In the event of mild hemorrhage, in addition to internal coagulants such as hemoplastin, calcium lactate, etc., the patient should be confined to bed and given opiates. If this is not sufficient, a speculum is introduced with great gentleness and, through slight separation of the blades, the rectum is packed with gauze saturated with adrenalin or a five per cent. solution of silver nitrate. An alarming hemorrhage calls for a general anesthetic, and control of the bleeding point. Unless a cut vessel has retracted, hemorrhage is never high up in these cases, a thing to be remembered.

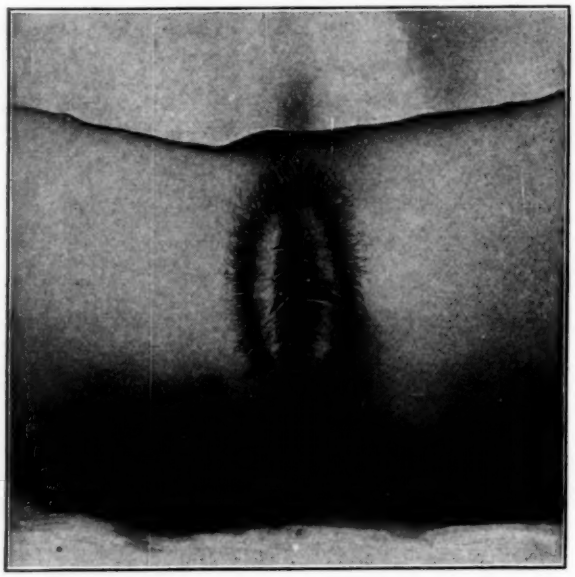

Fig. 6. Diagram to show numerous small breaks in the mucous membrane, due to dilatation of the sphincter. These are often mistaken for fissures. They require no treatment. A true fissure is seen on the right. (Modified from Gant.)

Patients usually tell their postoperative troubles to someone else, not to the operator. Therefore, unless one is extremely careful in hemorrhoid work, following each individual case to a satisfactory finish, many adverse conditions are likely to arise.

Imperfect union of the skin and mucous membrane after a Whitehead operation, which is usually the result of high section of the bowel, or irregular coaptation; eversion of the mucous membrane, with troublesome pruritus ani, on account of laxity through incomplete excision of tissue; too great tension of the skin about

the anus, due to overcorrection of external hemorrhoids; and tightness of the rectum from removal of too many internal piles, resulting in delayed action of the bowels and constipation, with painful defecation and fissure, are some of the many undesirable results that can be avoided only by the exercise of caution throughout the operation.

The appearance of the field after the two-clamp method has been used, is similar to that following any other hemorrhoid operation. There is much engorgement and eversion of the mucous membrane from dilatation of the sphincter, but eventually this all disappears. No two cases are alike. Each one requires an individual touch. Much that cannot be set forth in words must be expressed in variation of technic. Enough tissue must be removed, yet not too much. Good surgical judgment is required here. In external hemorrhoids, the whipped-over pedicle should be rather narrow and evenly designed. This will prevent the formation of irregular tabs about the anus, so common after most pile operations. Such tabs annoy the patient, and sometimes cause itching of the perineum. While the clamps are nearly always put on in the long axis of the bowel, there are instances in which oblique or transverse application will seem best. The two-clamp procedure may be carried out in a surprisingly short time, and with entire satisfaction, if one will vary the process in such a way as to meet the requirements of each particular case.

A CONSIDERATION OF GENITO-URINARY SYMPTOMS IN APPENDICITIS

NATHAN BLAUSTEIN, M.D.

NEW YORK

THE simulation of appendicitis by urinary disease is well known. In appendicitis, pain on, or frequency of, urination may be due to irritation of the renal pelvis, ureter, or bladder by the inflamed appendix or contiguous peritonitis. Pyelitis of the right kidney, or a stone lodged in the right ureter, has often led to the pre-operative diagnosis of appendicitis. The converse mistake is more rarely made, for genito-urinary symptoms are generally subsidiary in cases of appendicitis. Yet it is certain that cases occur in which renal or vesical symptoms are so prominent as to cause error in diagnosis. When urinary symptoms are accompanied by pelvic tenderness, or a tender lump is felt per rectum, or there is a positive obturator sign, the appendix will usually be found in the pelvis irritating the bladder. When accompanied by the other signs, the appendix is generally either near the kidney or at the pelvic brim.

The following genito-urinary symptoms may occur in appendicitis:

Frequency of micturition.
Pain on micturition.
Retention of urine.
Difficulty in urination.
Tenderness on pressure in the right costo-vertebral angle.
Hematuria.
Pain in either or both testicles.
Retraction of right testicle.

Frequency of micturition is not uncommon (4%) and usually results from direct irritation of the bladder by the peri-appendicular inflammation. When the appendix lies in the pelvis there is not, as a rule, any rigidity of the abdominal wall, and the combination of hypogastric pain, lax abdomen, and frequency of micturition might mislead the observer into thinking the bladder the source of the trouble. The symptom is more likely to be met in men, for in women the uterus and broad ligaments intervene between the bladder and the usual position of the pelvic appendix, while in the male any inflammation round a pelvic appendix must extend to the bladder.

Pain on micturition is quite common in cases of appendicitis, being present in about one case in ten. It may accompany inflammation of an appendix situated either behind the cecum, in the iliac fossa, at the right brim of, or deep in the pelvis. The appendix need not be perforated for this symptom to be produced. The reason for this pain is most probably the proximity of the inflamed appendix or the inflammatory exudate to the pelvis of the kidney, the ureter, or the bladder. The pain may come on late in the case and may then signify a sudden extension of the peritonitis.

Retention of urine, which Deaver claims is due to irritation of the bladder sphincter, is rather uncommon, and difficulty in urination is only an occasional complaint. Abdominal pain may be caused by acute distension of the bladder, but in such cases there is retention of urine or overflow incontinence.

Tenderness in the right costo-vertebral angle is frequent in disease of the right kidney or perinephric tissues, but in acute appendicitis there is also quite commonly pain in that region. This does not always indicate a retrocecal appendix, for the pain can sometimes be elicited in patients whose appendix is not lying on the quadratus lumborum. When a perforated appendix happens to be upon the quadratus lumborum, the pain under the posterior right rib margin is much greater. The simulation of an acute perinephric abscess

is sometimes very close and frequently occasions a mistaken diagnosis. Of course it must be remembered that a perinephric abscess may be the consequence of a retrocecal appendicitis.

When, as sometimes happens, frequency of, and pain on, micturition accompany tenderness in the right loin in a case of appendicitis, the simulation of pyelitis is very close. Diagnosis is complicated by the fact that in a few cases renal and appendicular lesions and symptoms may coexist. It is surprising that there are not many more cases, since the bacillus coli communis is a common offender in both, and not infrequently the inflamed appendix lies near the pelvis of the kidney.

Hematuria. There are numerous cases on record in which hematuria has occurred in the course of an attack of appendicitis. It is quite reasonable to suppose that irritation of the adjacent pelvis of the kidney or of the ureter may lead to hematuria in some instances, but before accepting hematuria as a symptom of appendicitis one has to exclude an independent pyelitis due possibly to the same organism that may have caused the attack of appendicitis.

Testicular symptoms in appendicitis have been only casually noticed in even the most exhaustive treatises on appendicular disease. Most writers do not seem to be aware of their occurrence, important though they be, for wrong diagnoses may result from lack of appreciation of these symptoms.

Testicular pain or discomfort occurs in probably about 5% of cases of appendicitis in the male. The pain is often not so severe as the general abdominal pain, and the patient may not complain of it unless directly questioned on the point. It is either of a dull, aching or of a sharp, shooting nature. The inferences are that pain in either or both testicles may accompany acute appendicitis. This pain is due to the appendical disease, and is not dependent on any disease of the genito-urinary system. Though the testicular pain is usually associated with perforation of the appendix, it may accompany appendicitis without perforation. The testicular pain may, rarely, precede the onset of the abdominal pain by an hour or two. The duration of the pain may be short or as long as two days. There may be local tenderness of the testicle accompanying the pain.

While it is tempting to suggest that direct irritation of the sympathetic nerves accompanying the spermatic artery may account for the testicular pain, yet the fact that the pain may be on the left side and may occur with a non-perforating appendicitis, negatives that explanation for at least some of the cases.

Retraction of the testicle is occasionally noted in cases of appendicitis. It is due to reflex contraction of the cremaster muscle, resulting from irritation of the genito-crural nerve.

Torsion of the imperfectly descended testicle may cause extreme pain in the inguinal region. Vomiting occurs and shock may be severe. The pain has the usual sickening character of testicular pain. The absence of the testicle from the same side of the scrotum makes diagnosis easy. Thrombosis or suppurative phlebitis of the veins of the spermatic cord causes pain in the inguinal region and sometimes the iliac region of the abdomen. But the swelling and painful area extend down to the testicle, which also becomes swollen and painful.

THE NATURE AND TREATMENT OF SCIATICA

ARTHUR E. HERTZLER, M.D.

HALSTEAD, KANSAS

DEFINITION. Sciatica may be defined as a painful affection of the sciatic nerve due to conditions within the nerve itself, produced by causes unknown or by irritating lesions adjacent to the nerve, and persisting after the subsidence of those conditions.

Pain in the sciatic nerves the result of some demonstrable organic disease should not be classified as sciatica. Thus pains due to organic nerve lesions higher up, disease of the spine and hip-joint, pelvic lesions, such as compression by expansile tumors or invasion by infiltrating tumors, should not be classified as sciatica. Such cases should be excluded from true sciaticas because they are but symptoms of some demonstrable lesion and treatment directed to the sciatic nerve alone, while the causative factor persists, must fail.

Etiology. Since the cause of sciatica is not known we can approach the problem only by considering the nature of the affections associated with its origin. There are in the main two lines that require consideration: That the beginning is due to a local irritation such as a myositis or a sacro-iliac affection, or that there is some unknown toxic source.

A common prelude to sciatica is a painful affection of the sacro-lumbar region. One common mode of onset is that after unusually strenuous labor of an unaccustomed character, particularly when associated with free perspiration followed by a sudden cooling off, there develops a sharp pain in the small of the back. I have often listened to a story such as the following: A farmer tosses a load of wheat into his wagon. In this process he perspires freely. On the way to town he feels somewhat chilled. Later on, in stooping, he experiences a sudden, severe pain, excruciating in character, which may be so intense as to cause him to fall. Usually he makes his way to bed and sends for the doctor. As he lies in bed the slightest movements excite severe pains. The point of chief tenderness is over the quadratus muscle, most often in its lower part just above the crest of the ilium. This is followed in the course of a few weeks by a typical sciatica.

Another common mode of onset is following a sudden, unusual movement involving the lower back. The following is an example: A young physician in making a call on a dark night is unable to find the dooryard gate. He kicks off a number of pickets to make a hole in the fence through which he may gain entrance. He makes his professional visit in a superheated room. He rides some hours in the chilly night. He awakens the following morning with an excruciating pain in the lower back. This gradually subsides and there follows a typical sciatica.

What has happened to cause these severe initial pains in the lower back and what relation if any, do they bear to the subsequent pain in the sciatic nerve, and why do the sciatic pains persist after the subsidence of the initial pain? There are two theories that require consideration: That the initial pain is a muscular rheumatism, a myositis; that it is due to a synovitis of the sacro-iliac joint.

Sometimes a sciatica begins gradually without preceding pain elsewhere and persists with varying intensity indefinitely. In such cases the popular pastime is to search for some focus of infection. Sometimes the search is successful. More commonly after removing, without results, the tonsils and the teeth and even the appendix and gallbladder, the conclusion is reached that the disorder is of unknown origin.

Myositis. In favor of this theory is that the site of greatest tenderness is over the quadratus lumborum muscle at its lower termination. The whole muscle

may be tender. Infiltrating the muscle with an anesthetic solution relieves the pain, sometimes permanently. The old flatiron gives marked relief. The pain is much like that felt in the trapezius in stiff neck when massage of the muscle brings great relief. Antirheumatics sometimes bring relief. Often after this pain persists for a time, pain along the course of the sciatic nerve begins. So frequently is this the sequence that some relationship may be assumed. The general assumption is that the myositis irritates the nerve.

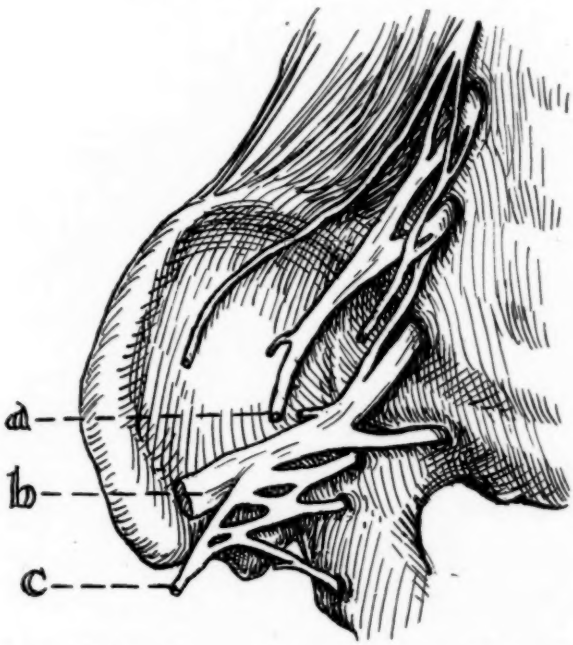

Fig. 1. The lumbo-sacral plexus: *a*, the anterior crural; *b*, the great sciatic; *c*, the pudic. The roots forming the anterior crural are closely associated with the muscles of the back as well as the psoas, while the roots forming the sciatic lie at a distance from the muscles.

Against this assumption is the very obvious fact that the nerve whose roots are mostly intimately associated with the muscle, the anterior crural, is never involved, while the great sciatic lying at some distance is affected (figure 1).

That there is an actual myositis or muscular rheumatism, if there is such a disease, rests wholly on assumption. It lacks the characteristic course of conditions in which a myositis can be proved.

Sacro-iliac Disease. The sacro-iliac is a true joint and though its movements are slight and difficult to demonstrate by palpation on the living we may be sure that movements do occur. In the recently dissected pelvis a slight movement is perceptible. This is obvious if long levers are clamped to the ascending rami of the pubes so that the slight movements of the bones are magnified. Heavy ligaments bind the sacrum to the ilium posteriorly but there is a definite joint lined with synovial membrane in front (figure 2). The joint membrane is histologically

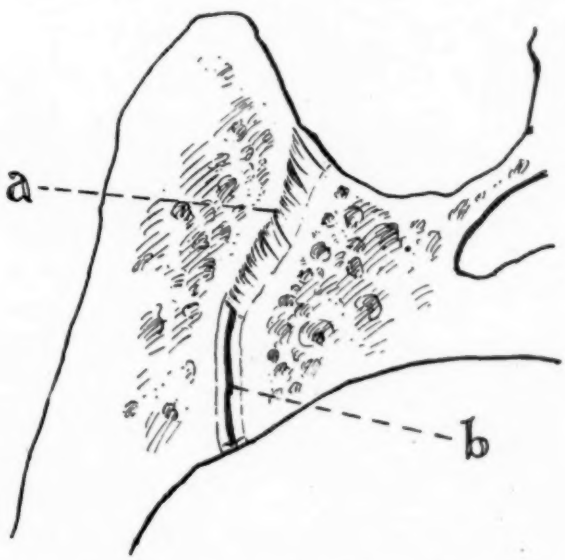

Fig. 2. Sacro-iliac articulation: *a*, ligamentous union; *b*, the joint cavity.

identical with any other joint lining. The point of greatest pain is often the upper extremity of the joint, but in some instances the site of greatest pain is directly over the lateral border of the sacrum. The pain is of that extreme lightning-like character which is experienced on slight movement when any inflamed synovial surfaces are impinged against each other. The intensity of this pain can be appreciated only by those who have experienced such an affection.

It has been assumed that the sacro-iliac joint is luxated or subluxated. No such an occurrence has been proven. In fact it can be easily demonstrated in the dissecting room that it requires the combined

efforts of several persons with long crowbars and a butcher knife to produce a luxation of this joint. Practical surgery teaches that the pelvis regularly will fracture before a luxation occurs. There is one case on record in which a sacro-iliac luxation did occur. A rapidly moving express train struck a boy—but he did not suffer from a sciatica afterwards.

On the other hand, it is known that synovial inflammations are most common after unusual movements, often repeated, particularly when associated with chilling

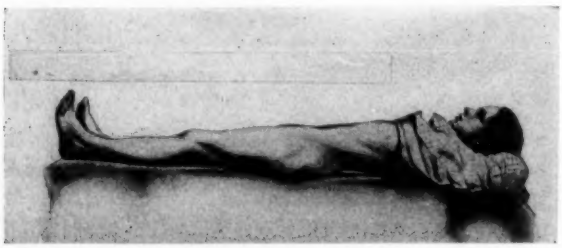

Fig. 3. The patient lying on a firm table shows the normal lumbar curve.

of the surface of the body. The beginning of the tennis and football season frequently demonstrates this fact. In inflammation of the sacro-iliac joint, when proven to exist, as in early sacro-iliac tuberculosis, such pain is produced. The course of the sacro-iliac pain is that common to the inflammation of synovial surfaces. Rest for a number of days alleviates the symptoms in acute cases.

The sacral plexus lies over the sacro-iliac joint at the point where the maximum irritation might be expected to occur and the character of the pain is such as one would expect in such an association. In view of these facts the most probable hypothesis is that the initial pain is a sacro-iliac synovitis which results in the secondary involvement of the sciatic nerve. That the former recovers while the latter persists is quite in harmony with the well recognized reaction of these tissues to irritation.

Insidious Origin. In some cases the onset is slow, without any obvious antecedent causative factor. Perhaps the history will disclose that in time past an acute affection was experienced. There is in many cases in the recent past just a backache of annoying character, often most marked in the early hours of the morning. At any rate, a careful history should be obtained before the patient is denuded of his removable appendages in the wild scramble to remove a supposititious focus of infection. After a careful history has been obtained a search for infectious foci is in order but only when demonstrated should operation upon them be proceeded

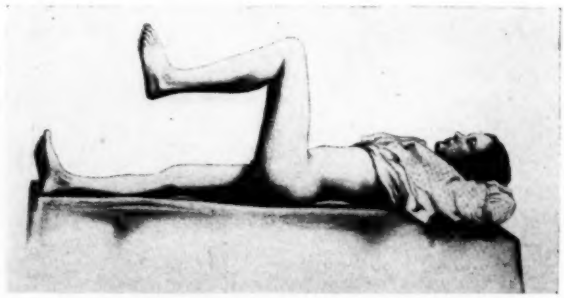

Fig. 4. The thigh is flexed to a right angle which leaves the curve undisturbed.

with. It is very rarely the case that a sciatica is cured by the obliteration of a "focus." In my experience it has always been an infected tooth, never a tonsil.

Symptomatology. The symptoms of sciatica may begin with great intensity and quickly reach their maximum. In such cases they are nearly always associated with sacro-lumbar pain. More commonly they begin gradually. There is at first a sense of drawing or soreness in the distribution of the sciatic nerve. It is usually most marked at first at the region of the sacro-sciatic notch, and then appears as a drawing pain extending down in the direction of the course of the great sciatic nerve. The most painful area may be in the mid-thigh, the popliteal space or even in the foot. In well marked cases the entire course of the nerve is painful.

The pains are intensified by exposure to cold, by movement and by pressure. It is those movements that tend to stretch the nerve that are most painful. Usually

by the recumbent position the pain is somewhat relieved but sometimes it is intensified, particularly in the early morning hours, thereby showing a kinship to lumbago.

The most characteristic painful point is where the nerve crosses the head of the femur—midway between the tuberosity of the ischium and the great trochanter, just beneath the lower border of the gluteus maximus or at the sacro-sciatic notch. The next most characteristic point is at the outer border of the popliteal space, just medial to the hamstring muscles especially near the head of the fibula, or along the peroneal or posterior tibial nerves. The posterior cutaneous nerve may be involved. It is only in the severer cases that the entire extent of the nerve is sensitive. In some no tender points can be discovered. In these a caution as to the diagnosis must be exercised. In some cases the sacral plexus will be found to be sensitive by rectal or vaginal examination. Those cases that follow lumbar or sacral pains often show a painful point at the lumbo-sacral junction.

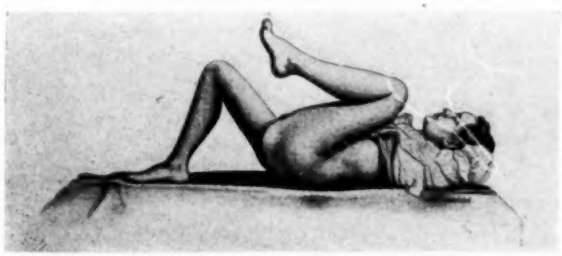

Fig. 5. The thigh is flexed beyond a right angle showing the obliteration of the lumbar curve and the rotation of the pelvis so that the sacrum is elevated from the table.

In some cases slight pressure and in others deep pressure is most effective in eliciting the pain. The extremity is held in the position calculated to put the least tension on the sciatic nerve—slight flexion and abduction of the thigh and flexion of the leg on the thigh. The classical test is that by which the sciatic nerve is put on the stretch: Lasegue's sign. The most convenient way of applying this test when the patient is lying on his back is to flex the thigh on the abdomen and the leg on the thigh. When the thigh is fully flexed the leg is extended. If the sciatic nerve is involved this will produce severe pain in the region of the hip or popliteal space or throughout the course of the nerve. If the patient is sitting, extention of the leg on the thigh will elicit the pain. When the patient is standing, stooping with rigid leg will produce it.

Among the minor signs may be mentioned the shrinking of the Achilles tendon of the affected side. The entire musculature of the thigh may become flabby. The surface of the thigh on the affected side may be noticeably cooler in long-standing cases.

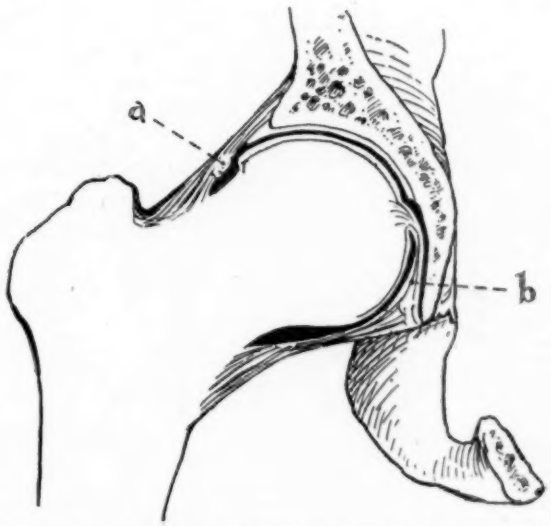

Fig. 6. Cross-section of the hip-joint showing the position of the annular ligament just as it slips over the head of the femur. It is the jumping of this ligament over the border of the head that gives the snapping sound and sensation when the thigh is fully flexed.

In long-standing cases a definite scoliosis may develop. The concave side is nearly always directed toward the unaffected side. This deviation of the spine is obviously for the protection of the affected side for as soon as the pain is relieved the deformity disappears. It has been ascribed to flaccidity of the spinal muscles on the affected side to the attempt to increase the space between the vertebral arches,—a purely fantastic conception. A scoliosis toward the affected side is

sometimes observed and even an alternating scoliosis has been described.

Differential Diagnosis. Sciatica is all too often regarded as synonymous with pain in the sciatic nerve. Before the diagnosis of sciatica is warranted a complete examination of the patient is necessary. It is only after the cardinal points above noted for the diagnosis of sciatica have been demonstrated and other sources of pain are excluded that the diagnosis can be considered as reasonably certain.

Two general sources, particularly, require consideration: affections that cause sciatic pain by pressure; and those due to some disease of the nervous system. There are a number of other conditions that require consideration but these are the most important.

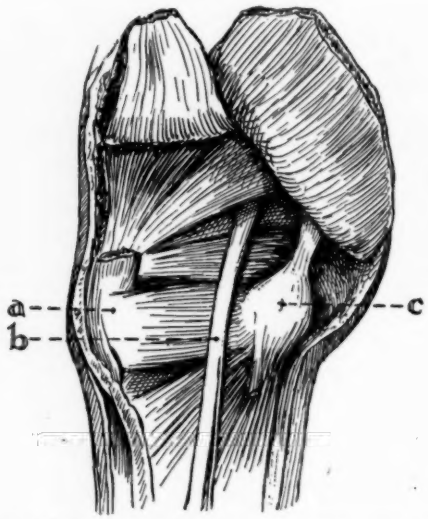

Fig. 7. Position of the sciatic nerve as it passes down the thigh: *a*, great trochanter; *b*, sciatic nerve; *c*, the tuberosity of the ischium.

Pressure on the Nerve or Its Roots. A common source of pressure is tumors, particularly sarcomas. These involve chiefly the pelvis. The sciatic pain may exist before any other symptom appears. There is lacking the history of the onset characteristic of sciatica and the painful points are absent. Long duration of the sciatic pain often rules out sarcoma but an *x*-ray study of the region should never be neglected. In tumors of the soft parts, notably extensions from the uterus, prostate and bladder "sciatica" is usually a terminal phenomenon, the sciatic pain appearing only after the malignancy has long been known to exist. Metastasis in the upper end of the femur, particularly from breast carcinomas may exist as a cause.

Inflammatory Affections. Sacro-iliac tuberculosis mimics sciatica most perfectly. Sciatica is rare in young persons while tuberculosis is most common in adolescents. Pressure against the iliac crests may elicit pain in tuberculosis and there may be fever and other evidence of tuberculosis. The chief reliance, however, must be placed on a careful *x*-ray study. Despite every precaution occasional error will be made early in the course of the disease.

Fig. 8. The cross indicates the point to which the nerve glides when the thigh is partly flexed for injection of the nerve.

Infections of the hip joint may cause sciatic pain. In acute infections the hip so dominates the field that error is unlikely. In chronic joint trouble the chief complaint is in the movement of the joint. In coxitis abduction is often limited and often full extension is not possible. Roentgenography usually makes the nature of the trouble clear enough.

Diseases of the Nervous System. Affections of the corda equina and the cord rarely produce for long a one-sided pain but tumors may do so for periods of months—quite long enough to permit errors in diagnosis. In such cases a careful neurological examination will reveal sensory and often motor disturbances, not a part of sciatica.

Unusual Diseases. A number of conditions are in rare instances confused with sciatica. Thromboangiitis obliterans may cause severe pain. This is confined largely

Fig. 9. Photograph of a skeleton showing the point at which the needle should come in contact with the neck of the femur.

Fig. 10. The needle is passed through the skin some distance below the line joining the tuberosity of the ischium and the great trochanter so that it approaches the nerve at an acute angle in order that the fluid may be deposited along a greater extent of the nerve.

to the foot and there are trophic and temperature changes therein as well as disturbances in the pulsations of the posterior tibial and dorsalis pedis arteries. The patients are usually young males. With "painful feet," due to bursitis, the pain sometimes extends to the calf and thigh, and may thus simulate sciatica. A careful study of the painful points in the feet will lead to a correct diagnosis. The thigh pains due to pelvic disease bear so little resemblance to sciatica that a differentiation is scarcely to be considered. Pelvic disease causes pain over the hip or around the anterior or medial side of the leg, not in the course of the sciatic nerve.

Treatment. Lower back pains are so often premonitory to sciatica that the discussion of their treatment may not be amiss.

In the severer back pains, previously prescribed, rest in bed is essential at the outset. The older authors began their treatment by the injection of morphine into the substance of the quadratus lumborum. This brings a grateful relief to the sufferer and it should not be denied him. Counter-irritants with chemicals, the hot wet pack, or the good old flatiron, will prolong the palliation. The older practitioners gave large doses of belladonna, hyoscyamus and particularly potassium citrate. These are still useful. The more recent atophan (cinchophen) is well-nigh a specific for these pains if given in large doses (30 to 50 grains a day), either alone or in conjunction with potassium citrate and belladonna or hyoscyamus. These are old-fashioned remedies and, of course, should not be used except by those who practice in the wide open spaces away from centers of learning. The back pains will yield to these measures in a few days without the use of any supporting apparatus. The milder cases, which comprise the majority, may be treated ambulant from the beginning. These remedies may be used with benefit for a time after the use of quinine injections in cases in which some soreness remains.

The management of sciatica, whether it follows the lower back pain, soon or remotely, or has no such antecedent

history, is another matter. The remedies employed in times past are legion. They comprised anodynes, antirheumatics and counter-irritants. They do not warrant enumeration.

Among the physical measures, stretching the nerve, exposed by operation, was sometimes practiced. Of more interest was bloodless stretching of the nerve. This was thought to be achieved by flexing the thigh on the trunk forcibly with the patient deeply under a general anesthetic. This gave but indifferent results, possibly because the nerve cannot be stretched by these means. The thigh cannot be flexed much beyond a right angle. When the thigh is flexed beyond this point the movement is taken up by the vertebrae. When the patient lies on a flat table the lumbar hollow is prominent (figure 3). This hollow is maintained until the thigh reaches a right angle or a little beyond (figure 4). Beyond this point the pelvis rotates as the thigh is flexed, first obliterating the lumbar hollow and then raising the sacrum from the table (figure 5). (Compare Hertzler, Studies in the Anatomy and Physiology of the Hip Joint. *Anatomical Record*, 1909, iii, 41.) Such manipulation therefore is good exercise for the lumbodorsal vertebrae but it does not extend the movement in the hip-joint hence does not affect the nerve.

It has been noted by numerous authors that when the thigh nears its maximum flexion there is a sudden jerk. This has been ascribed to lacerations of the hamstring muscles and even to the reduction of the hypothetic luxation of the sacro-iliac joint. As a matter of fact it is due to the slipping of the annular ligament (figure 6) over the head of the femur as any one can readily demonstrate in the partly dissected hip-joint. With the joint partly freed the circular band can readily be seen to jump down the crest of the head to the neck. If these fibers are cut with a narrow-bladed knife the jerk cannot be produced.

Mechanical appliances to the pelvis are useless in sciatica, because it is but the end-result, and its continuance is dependent on processes within the nerve itself which are in no wise affected by fixation.

The treatment by injecting fluids in or about the joint has been practiced for a considerable number of years. Large quantities of simple fluids have been used or some more potent anesthetic such as 70–80 cc. of 1% beta-eucaine solution.

For many years I have used an ounce of 1% quinine urea hydrochloride, injected as directly as possible into the nerve. Unless the needle reaches the nerve, results need not be expected. The nerve is injected at the point where it crosses the neck of the femur near the head at a point one-third the distance from the tuberosity of the ischium to the great trochanter (figure 7). When the thigh is flexed, as it is when in the position most favorable for making the injection, the nerve glides toward the trochanter (figure 8). In the partly flexed position the nerve lies midway between the tuberosity of the ischium and the great trochanter.

A No. 18 needle, five inches long, should be selected. In very fat persons a needle even of this length will not reach. The skin should be anesthetized with a fine needle since the introduction of a large one through the unanesthetized skin produces unnecessary pain and destroys the patient's equilibrium.

I have found it easier to strike the nerve by passing the needle 3 or 4 finger's breadths distal to the line joining the tuberosity of the femur (figures 9 and 10). The needle is passed in at this point and directed upward and inward until the neck of the femur is encountered. When this obstruction is reached the needle is varied in its direction until the patient complains of shooting pains in the course of the sciatic nerve. One can step along the neck of the femur with the point of the needle by withdrawing it but a short distance. When the nerve is encountered the patient notes the fact by the pains

produced along the course of the sciatic nerve. When this nerve has been definitely struck the injection is begun. An ounce of 1% quinine urea hydrochloride is sufficient. More is needless and mischief most likely can be done with even so harmless a drug if too strong a solution is used or an unnecessarily large amount is injected.

The patient should remain in bed a few days. The injections may be repeated in a week. In mild case, a single injection may be sufficient. Usually two, in severe cases three, injections are required. It is only in the very severe cases that more will be required. I have never found it necessary to use more than five, and that many but rarely.

In my experience there have been no failures and no recurrences. I have had no unfavorable results except in one case in which an infection took place beneath the fascia lata and required drainage. I have had verbal report of a case in which permanent (one year) sensory disturbance resulted; the technic and the amount used were not stated.

CONCLUSIONS

1. Lower back pains of a certain type are best explained on the theory that there is a synovitis of the sacro-iliac joint.

2. Sciatica often follows such affections and since the sciatic nerve roots lie over this joint we are warranted in hypothecating an irritation of the nerve by the joint inflammation.

3. The sciatic nerve cannot be stretched by manipulating the thigh.

4. The injection of a 1% solution of quinine and urea hydrochloride is a specific for sciatica.

THE POSTOPERATIVE TREATMENT OF ABDOMINAL CASES*

JEROME SELINGER, M.D., F.A.C.S.

Associate Professor of Surgery, N. Y. Post-Graduate Medical School and Hospital

NEW YORK

THE importance of postoperative treatment—with a considerable amount of thought to preoperative preparation—cannot be overemphasized. The busy surgeon today is so thoroughly occupied with his actual operating that he frequently cannot—or does not—devote sufficient time to the after-care of his patients. This is particularly true in large modern hospitals, where this very important work is often carried on in a more or less routine fashion. We must keep in mind that a patient's sojourn in a hospital is to him an event. It is therefore the duty of the surgeon not only to operate and to attempt to cure his patient, but also to keep him happy and comfortable during his stay in the hospital. This will aid in no small measure in reducing the period of convalescence.

This paper is not an attempt to review the subject of postoperative treatment. It is merely a résumé of the routine treatment carried out at the Post-Graduate Hospital in New York City—a revision, as it were, and enlargement of a paper written on the same subject about three years ago.

The preoperative cathartic has long since been discarded. It has been replaced by an enema the evening before and the morning of the operation. For twenty-four hours previous to operation the patient is advised to live as usual and encouraged to drink large quantities of water. One dram of sodium bicarbonate three times during the day preceding operation will probably aid in the temporary retention of fluids. The preoperative use of morphine is optional. Its advantages and disadvantages are pretty well balanced. Its use is certainly indicated in selected cases, particularly for thyroidectomy.

The postoperative treatment of laparotomies begins when the abdominal incision has been sutured. After the application of a layer of gauze over the wound, the adhesive straps are applied from below upward—like the shingles on a roof—and they should completely cover the gauze. This will, in a measure, prevent vomitus from coming in contact with the wound. Each successive strip should be applied a trifle more loosely than the preceding strip, thereby allowing for a moderate amount of distention without undue discomfort. The patient's operating-room shirt should then be replaced by a warm, dry one. After being removed to a wheel stretcher he should be well surrounded with warm blankets and taken as quickly as possible to a warm bed. An ether ward is most desirable, but few hospitals are sufficiently endowed to support this luxury.

Four cardinal orders are written on the chart by the anesthetist:

1. Nothing by mouth (including water) for 12 hours.
2. Moderate Fowler position.
3. "Routine" Murphy proctoclysis—continuous.
4. Morphine gr. ¼, plus gr. ⅙, q. 4h., p.r.n.

1. *Nothing by Mouth.* Almost all patients who have been etherized will pass through a longer or shorter—usually shorter—period of vomiting. It is practically never serious but always uncomfortable. The gastric mucous membrane is not ready for the reception of fluids until at least twelve hours have elapsed. It has been our experience that patients vomit considerably less, and frequently not at all, if everything by mouth be interdicted for at least twelve hours. To give water immedi-

*From the Surgical Department of New York Post-Graduate Hospital.

ately is, we believe, to invite vomiting. When the patient shows signs of restlessness, he should be given his full dose of morphine. He will then forget his thirst in renewed sleep. During all this time his absorption of fluids by rectum is helping to conquer his thirst.

2. *Moderate Fowler Position.* By elevating the head of the bed from four to ten inches, or preferably by using a Gatch bed, the best and most comfortable position will be obtained. In addition to aiding his comfort, this position, in both a mechanical and physiological fashion, tends to limit the rapidity with which toxins are absorbed.

The greater the activity of the peritoneum, the greater and more rapid the absorption therefrom, and vice versa. The diaphragmatic peritoneum moves with each respiratory effort, and absorption in this region is, therefore, more rapid. Furthermore, the female pelvis is, so to speak, acclimated and better able to care for infection than is the upper abdomen. Elevating the head of the bed will aid the gravitation of infective material towards the pelvis, where it will be slowly absorbed. Within twelve hours the infected area should be completely walled off. Then the elevated position serves merely as one of comfort.

3. *"Routine" Continuous Murphy Proctoclysis.* I know of no single contribution to postoperative or preoperative treatment equal in value to the Murphy protoclysis. This way of supplying the patient with both food and fluid, in addition to combating any tendency to acidosis, is the method par excellence. The routine Murphy drip at the Post-Graduate Hospital contains 1000 c.c. of tap water, plus 10 per cent (100 grams) of commercial glucose, plus 2 per cent (20 grams) of sodium bicarbonate. This is heated to 120° F. and placed in an irrigating can from which it is allowed to flow one drop at a time. The rubber tubing through which it flows is passed between two hot water bags that lie at the foot of the patient's bed. This will, to a degree, restore some of the heat of the fluid that is lost en route. There are other methods of keeping the fluid warm,—viz., the various patented vacuum bottles, surrounding the can with hot water bags, or inserting into it a quart milk bottle containing boiling water, or a sixteen-candle power incandescent lamp. These latter methods are mechanically incorrect, since they serve merely to keep the fluid warm. A small amount of fluid will very quickly lose its heat as it passes through approximately five feet of rubber tubing exposed to the air at room temperature. The hot water bags, as stated above, will in a large measure restore the heat that has been lost. With hot water bags in the patient's bed, however, the possibility of a burn must ever be kept in mind. They should be thoroughly wrapped so as to prevent a burn if, by accident, they should make prolonged contact with any part of the patient. To the end of the tubing is attached a number 32 F. catheter or a straight or a curved hard rubber tip. This is inserted not more than two inches into the rectum and allowed to remain. The rate at which the fluid is allowed to flow is varied with the individual patient. Forty drops per minute is ordinarily satisfactory. If the patient does not retain and absorb the fluid, then the fault is not with him, but rather with the fluid, or with the method of administration. The can may be hanging too high and the pressure may, therefore, be too great. The fluid may be flowing too quickly, it may be too hot or too cold, or the tip may be inserted too far. Every individual can absorb fluid by rectum, and failure of the patient to do so should cause the physician to find the fault with the technic. Under certain conditions, and with proper care and attention, I have seen patients absorb fluids to the amount of ten quarts, given continuously over a period of forty-eight hours. Ordinarily, however, this is excessive, and after the patient has absorbed one quart, it is wise to wait an hour before

starting a second one. Under these conditions three quarts can very easily be absorbed in twenty-four hours. Contrary to what one might expect, the rectal tip is borne with comfort and is not irritating.

As devised by Murphy proctoclysis consisted in the use of normal salt solution. It was soon discovered that, taken over a long period of time, saline solution is irritating to the rectum, that it increased rather than allayed thirst, that it frequently caused nausea and vomiting, edema of the eyes and ankles, and rarely, of the lungs. The next step in the perfection of the drip was the use of ordinary tap water. This proved quite successful. Then our most ambitious associates began to medicate it, and then to incorporate various foodstuffs, such as eggs, milk, etc. Out of these various experiments has grown what we believe to be (and for which we claim no credit) the ideal method of proctoclysis. Its formula has been mentioned above. Glucose, being a simple sugar, is readily absorbed, and furnishes nourishment. When one is receiving food the tendency toward acidosis is greatly reduced. The sodium bicarbonate is an added measure against such an occurrence. The tap water allays thirst and replenishes the body fluids.

The use of digitalis in the drip, either with or without glucose and sodium-bicarbonate, has been referred to many times in the literature during the last five years. The effect of this drug is supposed to be manifested in two directions: first, to prevent meteorism; second, to prevent tachycardia and to hasten the return to normal of the cardiovascular system. There seems to be no proof that digitalis has a direct action on the intestinal musculature. About three years ago, in a moderately large series of cases, we used digitalis regularly in the following way: 8 c.c. of fresh tincture was added to 10 ounces of a routine Murphy drip. This was given to the patient at the rate of 30 drops per minute. We saw no particular advantage in the use of this formula over the one minus the digitalis. It was probably a coincidence, but two of the cases so treated suffered from severe distention, which is entirely contrary to our usual experience.

Fluids given by rectum do not accumulate in this part of the intestinal canal. Experiments of Cannon have proven that under normal conditions there is present in the large intestine a so-called reverse peristaltic movement, and Bond has shown that particles of dye-stuffs placed within the canal are thus carried to the cecum.

4. *Morphine gr. ¼, plus ⅙ every 4 hours, as needed.* It is to be expected that every postoperative patient will have pain. Equally, the patient expects relief. In our experience morphine—alone or with atropine—gives the best and quickest results. It should be given in its physiological dose and repeated every four hours if necessary. To give a small dose of morphine is worse than to give none.

Those who oppose the use of morphine claim that it reduces secretion and excretion, with a particularly paralyzing effect upon the bladder, and that it causes or increases distention. It is quite possible that many morphinized patients will require catheterization. But it is better to catheterize a patient several times than to permit him to suffer pain. Morphine does splint the bowel, but by that very fact it permits the painless passage of gas with or without the insertion of the rectal tube.

After the second night, all opiates are discontinued. If a sedative is necessary after this time, we resort to bromides or luminal. They prove very satisfactory and are harmless.

Nausea and vomiting are distressing symptoms that occur, perhaps, in a majority of postanesthesia cases. By denying fluids by mouth for the first twelve hours, and by the early incorporation of the other post-operative orders—particularly the morphine—one can reduce postanesthesia vomiting to a minimum.

It is routine for a patient to vomit several times. After this he will be able to

retain small quantities of tap water at room temperature. The quantity is gradually increased and the patient has conquered the most distressing part of his postoperative convalescence.

If he continues to vomit and "spit up" small quantities of bile-stained fluid, then steps should be taken to empty his stomach. Our first procedure is to give a tumblerful of warm water in which has been dissolved 1 dram of sodium bicarbonate. We request him to drink all of it, hoping that one of two things will happen: either that the pyloric sphincter will open and the stomach will empty itself into the small intestine; or that it will act as a lavage by a complete emptying of the stomach into a pus basin. In a great majority of obstinate cases this simple procedure will suffice and the patients go on to convalescence without further difficulty. Occasionally they vomit in spite of this treatment, and it becomes necessary to institute further measures. We believe that one is justified in repeating the above before resorting to the stomach tube. If vomiting persists after the second "automatic lavage," then the stomach tube should be resorted to without further delay. We do not hesitate to use it after any type of abdominal section, including a resection of the stomach. In the latter type of case it should be passed with great care, it should not be inserted as far as in those cases where the stomach is not operated upon, and less fluid should be instilled. Ordinary water at a temperature of 110° F. containing a dram of sodium bicarbonate to the pint is an ideal fluid to use. The lavage should be continued until the fluid that returns is clear, care being taken that the amount of fluid recovered each time is the same as the amount instilled. The continued retention of a large amount of fluid may cause a rupture of the gastric suture line.

Rarely do we encounter vomiting after the first 24 hours. When a patient continues to vomit after the repeated use of the stomach tube, then one should search for a cause other than the anesthetic. The neurotic or hysterical individual may vomit for days because he thinks it is the thing to do. Elderly dehydrated individuals who have an acidosis may very quickly develop a toxemia with projectile vomiting. Dense bands of adhesions or an angulated bowel will cause vomiting due to obstruction. All of these forms require energetic and heroic measures.

Acute Dilatation of the Stomach. Fortunately this occurs very infrequently. Its incidence, however, in a mild form, is greater than one might suppose for it is, without doubt, often unrecognized. When, after the second day, a patient vomits or continues to vomit or "spills over" without effort a bile-stained, foul-smelling material, one should treat the condition as an acute dilatation of the stomach. The stomach seems never to be empty. On passing the tube immediately after a spell of vomiting, a quart or more of fluid as described above will be obtained.

There is but one major item in the way of treatment: keep the stomach empty. This must be done even if hourly lavage is necessary. Frequent change of position, with the right lateral predominating, may be of some benefit. Pituitrin and eserin have been used with questionable benefit.

Shock. It has not been many years since postoperative shock was a routine condition that called for energetic treatment. In the Post-Graduate Hospital today one rarely sees a patient in shock position. This condition is now anticipated. Except in an emergency, dehydrated patients are not operated upon until their fluids have been replenished. Abandonment of the wet preparation; warm operating rooms; less narcosis; less exposure and manipulation of the viscera; restricted loss of blood; morphine post-operatively; and the Murphy proctoclysis are all prime factors in preventing what was once a common occurrence.

Crile has made an exhaustive study of this condition and gives a detailed account of his work and theories in numerous articles and books. One should direct

one's energy towards correcting the following: (1) exhaustion of the vasomotor center; (2) a marked fall in blood pressure; (3) cerebral anemia; (4) collection of blood in the splanchnic veins.

The usual Fowler position should give way to the shock position, in which the foot of the bed is elevated eight to ten inches. Every attempt should be made to conserve the body heat and to supply additional heat. The patient should be well surrounded with hot blankets, and numerous protected hot water bags should be put into his bed. Abdominal massage and gentle artificial respiration are of benefit. They aid in relieving the splanchnic congestion and distributing blood into the depleted arterial system. The immediate infusion of 1000 c.c. of normal saline solution containing 100 grams of commercial glucose, is frequently a life-saving measure, to be repeated if necessary. Fifteen minums of a 1/1000 solution of adrenalin chloride should be injected into the tube through which the above fluid flows. This drug has a distinct action on the arterioles and raises the blood pressure. Its effect, however, is very transient and it should be repeated hypodermically every half hour. An ampule containing 1 c.c. of pituitrin is also recommended. Its effect is more prolonged than that of adrenalin. Medication by mouth is of no value. Stimulation by rectum is of distinct benefit, not alone by reason of any drug that may be used, but also because of the stimulating effect of the heat contained in the fluid instilled. The installation into the rectum of six ounces of black coffee, plus two ounces of brandy, at a temperature of 110° F. is an excellent procedure. The transfusion of 500 c.c. of blood is strongly recommended by Crile. This may be repeated if necessary. During the Great War, gum acacia was used intravenously by some surgeons as a routine in cases of shock. The British Expeditionary Forces were particularly fond of this. There were a large number of deaths, both immediate and latent, after its use. As far as I know, the cause of these deaths was not determined. My personal experience with the method does not warrant an opinion.

Hiccough. This is a not infrequent complication of abdominal operations. When it does occur, it is, as a rule, readily amenable to the simplest kind of treatment. Occasionally, however, it is a very difficult symptom to treat, and there are on record not a few cases of death directly attributable to it. Probably the most frequent cause of hiccough is a reflex stimulation of the phrenic nerves operating through the gastric branches of the vagi. This would seem to indicate a disorganization of the gastric chemistry, and treatment should be directed accordingly. It may also be due to deficient renal elimination, in which case a chemical analysis of the blood is indicated.

Various physical measures as well as numberless household remedies and drugs have been used to combat this condition. Among the most frequently used may be mentioned: repeated gastric lavage with several quarts of warm water containing two drams of sodium bicarbonate to the quart; the drinking of a tumblerful of water, or of a few drops of water; allowing a little table salt or sugar to dissolve on the tongue; one drop of tincture of iodine in a teaspoonful of water, repeated every fifteen minutes for six doses; allowing a little ice to dissolve on the tongue; small quantities of lemon juice, orange juice, or vinegar; holding the breath; drinking water while holding the breath; encouraging the patient to vomit, either by stimulating the palate or by the use of drugs; free catharsis; eating of solid food; cocaine or morphine by mouth or under the skin; chloral hydrate; the bromides; epinephrin; luminal; chloroform anesthesia; massage; the application of a tight abdominal binder; forced flexion of the thighs on the abdomen; the esophageal sound; intubation. With such a series of remedies, comment is hardly necessary. It appears that we do not know the cause of singultus, and the treatment is therefore

purely empirical. We should leave nothing untried in attempting to relieve the patient quickly.

Retention of Urine. This is rather a common condition after the use of a general anesthetic. It is particularly evident following gynecological and rectal operations. Following the repair of a recto-vaginal or vesico-vaginal fistula, a retention catheter should be inserted, thereby keeping the bladder empty at all times. If the precaution be not taken, the suture line is sure to break.

Following the usual laparotomy (assuming the patient to have been catheterized before being anesthetized), it should not be necessary to catheterize until at least twelve hours have elapsed. If examination reveals a distended bladder, a catheter should then be passed. If not, then one may wait an hour or two longer. Moderate distention of the bladder frequently stimulates micturition. Ordinarily one should not wait longer than fourteen hours. Hot bags or stupes applied to the suprapubic region are frequently a great aid in stimulating micturition. Failing in this, a hot enema may be tried, in the hope that the patient may void while expelling the enema. Frequent change of position is also of undoubted assistance. Pouring water from one vessel into another within the patient's hearing often starts the flow of of urine. If, after the second day, a patient is still unable to urinate, it is justifiable to allow him to sit on the edge of the bed or to stand on the floor, properly supported, in the hope that this will start the flow. Pituitrin or caffeine-sodium-benzoate given under the skin may be of some benefit. If, after the initial catheterization, the patient is still unable to void urine, one must resort to the catheter again, and, after withdrawing the urine, an ounce of a one per cent silver nitrate solution or an equal amount of a twenty per cent argyrol solution should be instilled and left in the bladder. Of course the strictest asepsis should be exercised whenever it is necessary to catheterize a patient. A soft rubber cathether is the instrument of choice.

Distention and meteorism, to any degree, is the exception rather than the rule. The preoperative enema instead of the preoperative cathartic, and the gentle and restricted manipulation of the abdominal viscera at operation, have done much to limit postoperative distention. When it does occur, it is practically always amenable to the most simple treatment.

The proper application of adhesive straps will allow for a moderate amount of distention without discomfort. Beyond that amount corrective measures should be instituted. Our first step is the use of a rectal tube. If this is properly inserted beyond the internal sphincter, it frequently allows the painless passage of gas. (If the patient is still receiving proctoclysis, it is temporarily discontinued.) Failing in relief by the use of the rectal tube, we resort to one of the various enemas. Those mentioned below are all eminently satisfactory:

Soapsuds enema—1000 c.c. water, at 110° F., thoroughly mixed with soapsuds.

Milk and molasses enema—1 pint of milk and 1 pint of molasses at 95° F.

Ox-gall enema—2 ounces of ox-gall, 2 ounces of glycerine, 2 ounces of turpentine, 1 pint of soapsuds, at 110° F.

Alum enema—2 ounces alum sulphate, 1 pint of water, at 110° F.

Ward enema—2 ounces saturated solution magnesium sulphate, 2 ounces glycerine, 3 drams turpentine, 1 pint soapsuds, at 110° F.

There are other enemas that are equally efficacious. When, after operation upon the colon, an enema is necessary, not more than eight ounces of any fluid should be used at one time. Frequently an ox-gall enema will give an excellent result when a milk and molasses enema fails, and vice versa. The same may be said of the other types. There appears to be no particular benefit.

We have never found that pituitrin or eserin is of particular benefit. These drugs cause more or less violent contrac-

tion of the visceral musculature and, in most cases, defeat the results obtained by the use of morphine. Generally speaking, their use is contraindicated. We should remember that prophylaxis is the first step in the eradication and cure of most ills. By eliminating the preoperative cathartic, we have taken a long step towards preventing meteorism.

Feeding. As mentioned earlier, ordinary tap water in teaspoonful doses should be the first thing given to a patient by mouth. If it is retained without nausea, the amount can gradually be increased, until three ounces are given at frequent intervals. On the day following the operation, our patients are allowed to have tea without lemon. It should not be the kind that brews continuously throughout the day, but should be weak and freshly made. It is given in three ounce feedings and may be sweetened with sugar. They are also allowed junket, zoolak, or oatmeal jelly, one ounce per feeding, alternating with the tea, and arranged so that they get one or the other every two or three hours. Water is given ad lib. in six or eight ounce doses. The proctoclysis is discontinued as soon as the patient can retain water by mouth.

On the second day following the operation the patient is allowed, in addition to junket and oatmeal jelly, his choice of strained gruels, lemon or wine jelly, cocoa or cocoa shake and ice cream. He may have a feeding every two or three hours. On the third day he is allowed soft diet. This includes, in addition to the above, thick soups, milk toast, poached or boiled eggs, cereals, custards, rice, chopped beef, baked potato and baked apple. He should be given a feeding every three hours. On the fourth day he is allowed the regular hospital diet.

The postoperative cathartic—like the preoperative—has been practically discarded. An enema on the second or third day after operation is generally all that is necessary. When the "regular diet" stage has been reached, we find it most efficacious to incorporate two or three tablespoons of bran with the morning cereal. This will aid the patient materially in having a daily normal bowel movement. I cannot urge too strongly the advisability in eliminating the postoperative cathartic as a hospital routine.

By experience we find it is wise, particularly in stomach cases, to withhold lemon, orange, and other fruit juices for at least three days. If given earlier, that is, before one is able to take solid food, they are likely to cause a succorrhea with disagreeable, sour and burning eructation of gas. They may also produce nausea and vomiting. In ulcer cases, they—together with the various broths—are interdicted during the patient's stay in the hospital. After a gastroenterostomy, or other operation of ulcer of the stomach or duodenum, we proceed on the assumption that the patient has been prepared for a cure. On leaving the hospital he should be placed in the hands of a competent internist.

When should a patient's dressings be changed? Assuming the case to be a simple appendicectomy, the patient having no elevated temperature after the third day and no pain in his wound, there is no reason for removing the adhesive straps until the time has arrived for removing the sutures. This should be done on the eighth or ninth day. If there is a drain, as in cholecystectomy for example, this should be removed in two or three days, and the wound restrapped and left undisturbed until the sutures are to be removed. Too many of us inspect the patient's wound too often. If the wound is infected the patient will have pain and his chart will show an elevated temperature. To remove a patient's dressing several times for purposes of inspection is not only bad technique, but a waste of time and money. A clean abdominal wound needs no attention until the sutures are to be removed.

Most abdominal cases are allowed to sit up in a wheel chair on the eighth day. They are permitted to walk on the following day, and are sent home on the twelfth

day. Patients operated upon for incisional hernia are kept in bed until the tenth day.

The general rules for postoperative treatment at the Post-Graduate Hospital are well systematized. There are a number of definite laws that are always put into use regardless of the type or kind of case. Other measures are purely symptomatic. Ordinarily, postoperative treatment is not difficult. The recalcitrant cases, however, are frequently a cause of considerable worry to the surgeon.

SURGICAL CONSIDERATIONS OF PUBLIC HEALTH AND PREVENTIVE MEDICINE

J. DUFFY HANCOCK, B.S., M.D.

LOUISVILLE, KY.

WHEN so much is heard and seen of the results of preventive medicine, as accomplished by sanitation, control of epidemics, periodic health examinations, etc., it is not surprising that the surgical aspect of the subject is sometimes overshadowed. With no intent to minimize the achievements of medicine, I believe we owe it to the public to place greater emphasis on the surgical considerations than has been done. A tendency in this direction has been indicated by the establishment of a "cancer week," campaign, the most beneficial results of which have probably been noted in the earlier observation of mammary neoplasms in women.

In my opinion the inauguration of an active educational campaign among the people generally, emphasizing the importance of early recognition of symptoms suspicious of surgical disorders in various parts of the body, would be productive of beneficial results. People should be taught that the time to submit to a surgical operation is before serious tissue damage has been done, and we should also endeavor to eliminate the prevailing dread of operative procedures.

The following brief outlines are submitted: Attention should be called to the significance of pigmented moles located anywhere on the body surface, particularly when they begin to increase in size. The malignant possibilities of irritated moles, ulcerating areas on mucous surfaces or elsewhere, and of so-called "pimples" that repeatedly scab but do not heal, should be emphasized; and people should be encouraged to inspect the mouth, face and body frequently for such lesions. Carbuncles are so serious that the application of household remedies should be urgently discouraged.

Acquired conditions are not the only ones to be considered. We should teach the people, with the additional aid of "before and after" illustrations wherever possible, how harelip and cleft palate can be improved, and what effect upon the social and economic states will follow.

The importance of early recognition and proper treatment of inflamed (or malignant) cervical glands should be duly explained and emphasized.

The people should be taught not to wait for the appearance of choking sensations or excessive enlargement of the thyroid gland before seeking medical aid. They should be made to know the significance of earlier symptoms, such as sudden fatigue not otherwise explained, persistently fast pulse, loss of weight, nervousness, etc., and we should impress upon them the difficulty or impossibility of restoring to normal a heart damaged by goiter because of delay in treatment.

The campaign against mammary carcinoma has been productive of excellent results. With the possible exception of pleural empyema, the greatest number of surgical procedures about the chest are made necessary by the presence of disease involving the mammary glands. The success already achieved should not cause us to discontinue the campaign of education in this particular field, where so much benefit may be derived from early treatment and so little good can be accomplished later. Women should be instructed to examine their breasts frequently, and we should be insistent that a physician be immediately consulted at the first appearance of an abnormal discharge from, or a slowly healing ulceration about, the nipple, or a "lump" in the gland structure. The fact that pain is often absent in disease of the breast must be emphasized.

Symptoms of intraabdominal affections are probably the most difficult to be evaluated by the patient. Perhaps better results might be obtained if we could convince the general practitioner of the advisability of more frequent recourse to surgery for various intraabdominal disorders. Recurrent attacks of so-called "indigestion" should be thoroughly investigated. When treating gastric ulcers medically, the internist should remember the increasing incidence of malignancy beyond middle age.

Why should the general practitioner allow his patient with cholelithiasis to suffer repeated attacks of gall-stone colic when the mortality of interval operations is so insignificant, compared with that occurring later in the presence of cholemia, to say nothing of possible carcinomatous change?

There is nothing more startling than the contrast between an interval operation for appendicitis and one after rupture has occurred, as regards both the operative difficulties and convalescence. It is difficult to understand why a patient with recurrent or chronic appendicitis should be subjected, by delay in surgical treatment, to the dangers of lowered vitality and increased mortality rate.

Among the people generally there has been, and still is for that matter, considerable ignorance in regard to some of the commoner rectal disorders, and undue hesitancy in permitting physical examinations for their detection. This attitude has been productive of much harm. The day will be unlucky for charlatans and fortunate for patients when the latter become acquainted with the frequency of rectal diseases and their curability by the institution of rational surgical methods. People should be taught that, in the vast majority of instances discharging anorectal fistulæ can be cured, that rectal operations are not ordinarily followed by damaged sphincter muscles, that a bloody and mucous diarrhea may be a grave symptom, that fecal incontinence can often be relieved, that hemorrhoids can be cured, etc.

Despite our attempts at education through compensation work, we have scarcely scratched the surface so far as herniæ are concerned. The average male adult, upon noticing a lump or pain in the groin, is more likely to purchase and apply an imperfectly fitting truss and wear it so long as it lasts, than to consult a physician or surgeon. When the symptoms become so aggravated that he is thereby compelled to seek medical aid, the surgeon is generally handicapped by the unhealthy condition of his muscles due to atrophy from pressure of the truss plus the degenerative changes of advancing age. In the interest of the patient with hernia we should advocate early operative treatment, which will result in lowered mortality, increased chance of success, and longer enjoyment of life, to say nothing of the economic advantages to the individual.

Dysuria, pollakiuria, pyuria, renal colic, and hematuria, are danger signals of disease involving the urogenital system, and are indications for complete and competent examination.

Pelvic lesions are quite important from the standpoints of efficiency, general health, and mortality. The day has passed when women should be allowed to believe that severe flooding at their menstrual periods and "spotting" between times are signs of the climacteric. It is no wonder that the menopause is regarded so seriously by women when only too often death has followed such signs.

Much may be accomplished by plastic surgery which will add to the comfort and well-being of the patient. Relaxation of the perineum may result in a relaxed anterior vaginal wall, or a displaced uterus, with the production of numerous annoying symptoms. A lacerated cervix may not only cause an offensive vaginal discharge, but is always a potentially malignant area. Both these conditions are susceptible to relief by plastic surgery.

Deformities of the extremities have been

accorded prominent consideration recently in this state by the activities of the Kentucky Commission for Crippled Children. Most of the surgical work performed has been for the correction of deformities following anterior poliomyelitis. While those interested deserve to be congratulated upon the splendid results obtained, we should not forget those individuals who have been crippled by accident. For example, why should we not induce one whose limb has been amputated to have the stump repaired or fitted for an artificial limb rather than allow him to hobble through life on a peg-leg or crutches?

Congenital defects, such as webbed fingers, supernumerary digits, etc., should be corrected early. There are too many unavoidable handicaps in life to neglect the correction of those that are amenable.

DUODENAL ULCER; PERSISTENT HEMORRHAGE; OPERATION; SECONDARY OPERATION FOR INTESTINAL OBSTRUCTION: A CASE REPORT

FREDERICK C. WARNSHUIS, M.D., F.A.C.S.

GRAND RAPIDS, MICH.

NOW and then the surgeon encounters a persistent hemorrhage from a gastric or duodenal ulcer that demands operative interference. The following case is illustrative:

C. P., male, age 45, February 9, 1926.

Past Health. Had typhoid at age of thirty. Denies other illnesses, accidents or injuries. Has had "stomach trouble" for several years. During past two years has had severe epigastric pains coming on after meals and at night, relieved by soda but not by food. Has vomited occasionally. Has had some medical treatment. Has lost some weight. Bowels regular; never noticed tarry stools.

Present Illness. Admitted to hospital because of severe hematemesis. At 4:00 A.M., January, 26th, awakened by pain and nausea, which were followed by vomiting of about a pint of blood. Vomited a like amount at 5:30 A.M. Several watery, bloody stools. Felt faint.

Examination. Pulse 100, temperature, 98°, respiration 28. Blood pressure 90/58. Fairly well nourished man, giving general appearance of acute anemia. No evidence of focal infection in nose, mouth or tonsils. Pupils react to light and accommodation slowly. No palpable cervical lymph glands. Thyroid not enlarged.

Lungs: No percussion dullness. Breath sounds distant. No râles. Heart: Normal apex beat, no enlargement, no valvular disease. Soft hemic murmur. Abdomen: Soft, not distended. No tumor masses. Tender on pressure over gall-bladder. Reflexes present and active. Skin: Clear. Marked paleness of ears, finger nails and mucous membranes. Urine: Slight trace of albumin and one-plus pus. Specific gravity 1,009. No acetone. Blood: Hemoglobin 65 per cent. White count 14,500. Red, 2,450,000. Blood sugar, 241 mg. per 100 c.c. N. P. N. 64.6 mg. per 100 c.c. Chlorides 525 mg. per 100 c.c. as sodium chloride. *Summary:* History characteristic of duodenal ulcer of several years duration. Sudden nausea and vomiting of blood with bloody stools. Moderate acute anemia. *Diagnosis:* (1) Duodenal ulcer. (2) Acute hemorrhage from duodenal ulcer. *Progress:* Patient given morphine, ¼ grain. No food or fluids by mouth. Rectal drip of tap water.

February 10th—At 4:00 P.M. was given enema. It was returned with abundant black and red stool. Patient seemed to be weak from loss of blood, pale, skin cold and clammy.

At 6:45 P.M. spit two or three ounces of bright red blood. He was given morphine sulphate gr. ¼ and hypodermoclysis was started. Complained of nausea.

About 9:15 P.M. vomited nearly a pint of bright red fluid. He was given another ¼ gr. of morphine sulphate. Twenty minutes later he had an involuntary bowel movement—an abundance of black mush.

February 11th—7:30 P.M. No vomiting and no stools for past 24 hours. Appears very pale and anemic. Pulse 106. Blood pressure 102/60. Morphine gr. ⅙ every three hours.

February 12th—Transfusion of 300 c.c. citrated blood at 6:00 P.M. Did not give more because he complained of increasing nausea and headache. Morphia gr. ⅙ after the transfusion.

No vomiting since February 10th. While this transfusion was being given and also once or twice on previous occasions the patient made remarks which made me wonder if there was not mild mental derangement.

February 13th—About 2:20 A.M. intern was called to try to get him to go to bed. He insisted upon walking through the ward and wanted his clothes to go home. He finally picked up a chair and endeavored to hurl it through a window. He was then given morphine sulphate gr. 1/12 and hyoscine hydrobromide 1/150 and put in a restraining sheet.

February 14th—For past two days bleeding has been controlled. Today started water by mouth in small amounts. This afternoon vomited about six ounces of bloody fluid. Pulse 100 and of good quality. At 11:45 P.M. pulse remains good volume, about 100; patient asleep.

February 16th—At 1:10 A.M. vomited eight ounces of bright red blood. Since then he has been feeling very weak and complains of a

severe headache. He is no longer irrational. Hemoglobin 38%, r.b.c. 2,320,000.

9 P.M. Transfusion 650 cc. citrated blood, group II, Hgbn 28%, r.b.c., 1,840,000. Matched blood. No immediate discomfort or reaction. Blood pressure 92/50 before transfusion and 100/58 after transfusion. Because of continual bleeding, exploration and local treatment of ulcer, if practical, has been decided upon.

Operation. Median line incision revealed very pale viscera. Scar found on pylorus, which on being opened did not reveal any ulcer. Posterior gastro-enterostomy.

11:50 P.M., returned from operating room in good condition. Hypodermoclysis 2,000 cc. Blood Pressure 106/60. Pulse 104.

February 17th—11:00 A.M. Triplex enema relieved distention and patient expelled large quantity of tarry fluid stool. Epigastric pain. Pulse 100. Blood Pressure 110/60. Glucose and soda per rectum; nothing by mouth.

3:00 P.M. Choking sensation, inability to breathe, rapid pulse, sensation of pressure on chest. Stomach dilated; pulse rapid. Gastric lavage. Large quantity of gas expelled through tube. Lavage returned clear. Marked relief.

11:00 P.M. Again difficulty in breathing and choking sensation. Pulse 130, respiration 36. Blood Pressure 112/60. Gastric Lavage—large quantity of gas and some slightly brown liquid. Temperature at 8:00 P.M. 101.6°. Intravenous glucose solution infusion 300 cc., 10%. Complains of thumping in head. Coarse râles posteriorly on both sides; no dulness. General condition only fair.

February 18th—10:30 A.M. Pulse 120 to 140. Temperature 100.8°. Blood Pressure 106/60. Is not voiding much. Somewhat irrational. Saline hypodermoclysis, 1,500 cc. Complains of feet being cold. Water, one ounce by mouth q.h.

4:00 P.M. Restless and irrational. Kept in bed with difficulty and is not voiding urine.

February 19th—9:00 A.M. Involuntary dark brown liquid stools during the night. Has not voided since catheterization at 4:00 P.M. yesterday. Bladder not distended. Water increased to two ounces q.h. Saline hypodermoclysis 1500 cc. Temperature 100.6°, pulse 100, respiration 22. Blood Pressure 122/68. Condition improved.

7:00 P.M. Seems rational. Voided a large quantity involuntarily this afternoon. No nausea or vomiting. Five per cent glucose solution 650 cc. intravenously. Blood Pressure 116/62. Pulse 90.

February 20th—9:00 A.M. Pulse 100. Blood Pressure 100/58. Seems drowsy. Has not voided since about 3:00 P.M. yesterday. Started on broth or plain albumin, one ounce q. 2 h.

P.M. Rather drowsy. Voided 24 ounces at 1:00 P.M. Pulse 100, respiration 20, blood pressure 97/56.

February 21st—General condition fair. Blood Pressure 102/54. Pulse 90, respiration 20, temperature 98.6. No nausea or vomiting. No distention. Is receiving plain albumin or broth three ounces q. 2 h. and water four ounces q. h. if desired. Fluid intake not very high. Glucose Solution, 10%, 650 cc. intravenously this afternoon.

February 22d—This A.M. appeared bright and in excellent condition. Now is getting water as desired and four ounces of broth or flavored albumin q. 2 h. Is voiding satisfactorily. This evening complains of pains all over and headache and is irritable.

February 23d—10:00 A.M. Slept poorly. Vomited one-half ounce greenish yellow fluid. Complains of sour taste. Temperature 98.4°, pulse 84, respiration 20, blood pressure 104/58.

9:00 P.M. No gastro-intestinal complaint. Severe headache. Enema effected dark brown stool.

February 24th—More comfortable today. Diet consists of any liquid, three ounces q. 2 h. Pulse elevation this P.M. from 80 to 100.

February 26th—Coughed and broke open 1½ inches of lower part of incision in skin during night. No bowel protrusion. No pus. Strapped with adhesive.

February 28th—Continues to improve. Temperature 99.4°, pulse 94, respiration 22. Evidently no bleeding. Stools yellow. Has been receiving poached eggs, toast, broth and fruit juices. Condition satisfactory.

March 2d—Complains of abdominal discomfort, especially after eating. Unable to chew food because his false teeth do not fit. Temperature 98°, pulse 80, respiration 20. Pale and somewhat yellow. Has been receiving soft diet. Some serous drainage at lower end of incision.

March 4th—For past day has been vomiting rather persistently. Last night and today vomitus has become of fecal odor and is projectile. Complains of abdominal pain at lower end of incision. Pulse has increased from 80 to above 100. Blood Pressure 102/68. There is a bulging, gas-containing area at lower end of incision very suggestive of obstruction. Upper left quadrant tympanitic; remainder of abdomen

dull on percussion. Gastric lavage about 200 cc. —yellow fluid and vast amount of gas removed. Intravenous glucose solution 5%, 900 cc. at 11:00 A.M. for exploratory operation at 12:15. Evidence of intestinal obstruction.

Second Operation. On opening incision of previous operation under local anesthetic, distended bowel was found. Under ether anesthesia distended bowel was followed down to collapsed bowel which was found about half way between ileum and jejunum where the gut was sharply angulated and adherent to raw surface of the omentum. On separation of this adhesion, obstruction disappeared.

March 5th. Has not vomited; abdomen not distended.

7:30 P.M. Since 2:00 P.M. has been vomiting material brown in color and of foul fecal odor. Gastric lavage and two ounces castor oil through tube.

March 6th—10:30 A.M. Has not vomited since lavage yesterday. Enema this A.M.: yellow fluid with small amount of gas, no oil. Abdominal pain. Fruit juice by mouth. Glucose Solution 10% intravenously.

Eructating very foul yellow fluid this afternoon. Gastric lavage at 6:00 P.M. Thereafter no vomiting. Temperature 100.8°, pulse 112, respiration 24. Is voiding. Doubtful whether castor oil went through.

March 7th—10:00 A.M. Slept much better last night and feels vastly improved this morning. Has stopped vomiting. Bowels moved involuntarily last night. Glucose solution 10%, 300 cc. intravenously. Temperature 100.4°, pulse 100, respiration 20.

March 8th. Feels fairly well. Enema this A.M. effectual. No vomiting. Slight abdominal pain in region of incision. This evening complains of headache and pain in back.

March 11th. Progress with no untoward symptoms. Modified soft diet. No discomfort. Bowels responding to enemas.

March 15th. Dressing done. Wound satisfactory; small amount of serous discharge. General condition good. Is taking food without discomfort. Bowels respond well to daily enema.

March 19th. Progress for past five days has been without complications. Is taking special diet with no gastric distress. Bowels responding to enema daily. Color improving. Hungry.

March 22d. Complains of gas and abdominal discomfort after eating. This has been relieved somewhat by soda bicarbonate. Dressings changed, wound in good condition.

March 23d. Up in chair. Temperature, pulse, respiration normal. Soft diet.

March 28th. Has developed slight cough and some coryza.

March 31st. Taking meals with regularity. Up most of the day, but still rather weak. Rather sallow. Being discharged today.

SUMMARY

1. History of ulcer of several years duration.

2. Acute hemorrhage, arrested by withholding all liquids from stomach, recurring when feeding is resumed or following transfusions. These repeated hemorrhages repeated until a grave state of anemia ensued, when operative interference was undertaken.

3. At operation, on opening duodenum a denuded or bleeding vessel was not discovered. An old scar excised and lumen closed, then posterior gastro-enterostomy. This again bears out the reported experiences of other surgeons as well as our own that in these severe hemorrhages with accompanying acute anemia, it is difficult to find the bleeding point. Prolonged search is not justified by reason of the poor condition of the patients. Occlusion of duodenum and gastro-enterostomy alone can be credited with the arrest of bleeding.

4. The attending acute gastric dilatation responded to frequent lavages.

5. The patient experienced a temporary mental derangement by reason of the acute cerebral anemia.

6. Approximately twelve days after first operation an intestinal obstruction occurred necessitating a second operation.

7. Purposely gastric feeding was restricted postoperatively and the patient was supported with saline solution and glucose and soda.

8. Six months have elapsed. Patient is symptom-free and is working. The anemia has disappeared.

THE CANCER SYMPOSIUM AT LAKE MOHONK

WM. B. COLEY, M.D., F.A.C.S.

NEW YORK

WHAT was probably one of the most important and most memorable meetings for the discussion of cancer, opened at Lake Mohonk, N. Y., on the evening of September 20, 1926, and continued for four days. While a series of international cancer research conferences had been instituted some years before the war, the first one in Brussels in 1907, the second in Paris in 1910, and the third in Brussels in 1913, these gatherings were purely scientific in character, and were devoted chiefly to laboratory studies of cancer in animals. The Mohonk meeting marked the beginning of a world-wide attempt to organize and bring into close cooperation all the workers in the field of cancer, both clinical and laboratory. Dr. Howard C. Taylor, the President, and Dr. George A. Soper, the Managing Director of the American Society for the Control of Cancer, are to be congratulated on their success in persuading such a large number of distinguished foreigners to attend the conference. In his opening remarks Dr. Taylor stated that one of the objects of the meeting was "to bring out all we know about cancer." Dr. William H. Welch, Director of the School of Hygiene and Public Health of Johns Hopkins University, extended a warm greeting to the foreign guests on behalf of the American medical profession; and Sir John Bland-Sutton, President of the Royal College of Surgeons of England, made a very happy and felicitous response on behalf of the foreign guests.

As the meeting advanced, it soon became evident that most of the papers and discussions were devoted to matters of organization and a few, to the facts known about cancer. No attempt was made to give the public any clear idea of just what has been accomplished by surgery in the effort to cure cancer, except in the case of Dr. Charles H. Mayo who read a paper written by Dr. Donald C. Balfour, on the end-results in cases of cancer of the stomach observed at the Mayo Clinic. Dr. Balfour's paper gave what is probably the most brilliant results ever obtained by surgery in the treatment of cancer of the stomach; but when it is noted that more than fifty per cent. of these cases had already reached an inoperable stage at the time of first observation, it is at once apparent that the percentage of cases actually cured form a small proportion of the total number suffering from cancer of the stomach. Furthermore, when we group together the cases of cancer of the stomach scattered throughout the country, which are operated upon by the average surgeon instead of by the most skilful and experienced, the number of cases cured by operation must be much smaller.

Dr. Raffaele Bastianelli, Associate Professor of Clinical Surgery of the Royal University of Rome, and Vice President of the Italian League for the Control of Cancer, was one of the few speakers at the Mohonk conference to sound a distinctly pessimistic note as regards the success of a world-wide organization for the control of cancer. While he is in complete sympathy with the efforts that are being made throughout the world to control cancer by educating the public, yet, he pointed out, "we cannot hope to engage in the fight with wholly effective weapons until the cause of cancer is known to us, so that our chief aim in trying to control cancer must be in the study of its cause. Our campaign must be divided equally between research and control."

One of the most important contributions to the conference was an address on Prevention of Cancer, delivered by Dr. James Ewing on the opening evening during one of the two open sessions of the conference. Dr. Ewing is a firm believer in the theory that chronic irritation in some form is responsible for the majority of cases of cancer. He states that cancers known to be the result of definite preventable causes are especially those of the lip, mouth, tongue, tonsil, stomach and breast. He believes that the subject of cancer prevention has not yet received the attention and emphasis it deserves. The neglect of this subject is due, in his opinion, to three main obstacles, namely, the heredity assumption, the parasitic theory of the origin of cancer, and most important, the fact that no immediate tangible results have been forthcoming. Dr. Ewing discussed in some considerable detail each of these three so-called obstacles.

We find that Dr. Ewing is, perhaps, a trifle

less dogmatic than he was in former years concerning the subject of heredity. He now affirms, that, "One may cheerfully accept all the data and still see that the hereditary tendency is not the disease itself, that the usual exciting factors must be brought into play, and that in hereditarily predisposed subjects the preventive factors may be successfully excluded."

No one could still have any doubt that cancer is hereditary in mice, and presumably so in other animals if not in man, after listening to the brilliant and impromptu discussion of Dr. Maud Slye concerning the results of her incomparable research study of hereditary cancer in mice, covering a period of seventeen years during which she studied 75,000 mice and, with special reference to the genetic family history, 5000 mice. Dr. Slye claimed that by selecting the strains and inbreeding she could produce offspring with five per cent. mortality, or with fifty, eighty, or one hundred per cent. While we may accept what Dr. Ewing states in regard to human beings inheriting the tendency to cancer and not to the disease itself, we cannot overlook the fact that all human beings are subjected to the same or similar sources of chronic irritation or trauma, and for those who have inherited the predisposition to cancer it amounts to nearly the same as though they had inherited the disease itself.

Dr. Slye made another observation of great significance, namely, in regard to the much disputed influence of trauma as a causative factor in the production of malignant tumors. She stated that while local trauma occurring in individual mice with no hereditary predisposition practically never resulted in the development of a malignant tumor, in cases in which this predisposition was well-marked, local trauma in a considerable number of cases resulted in the development of a tumor. Most interesting of all was her discovery of a hereditary prediposition to cancer of certain organs or certain parts of the body. In the case of a family of mice in which a large percentage had died of cancer of the breast, local trauma to other parts of the body failed to produce any result, but local trauma to the breast resulted in the formation of cancer of the breast. Likewise, in another strain with a predisposition to cancer of the mouth, local injury to other parts of the body was followed by no result while local injury to the mouth resulted in the formation of a cancer of the mouth. From these remarkable observations we learn that two factors of equal importance are necessary in the production of cancer, first, a certain predisposition, either inherited or acquired, and second, a local factor in the form of chronic irritation or trauma.

What Dr. Ewing regards as the second and greater hindrance to progress in the study of the control of cancer, is the widespread belief in the parasitic origin of cancer—the belief that it is due to a yet undiscovered parasite and that effectual prevention must therefore wait upon its discovery. He states: "At the present day, I have no hesitation in committing myself without reservation against this theory. With most general pathologists, I regard it as incompatible with the known facts about cancer. The assumption of a universal cancer parasite can be held only by those who assume, in addition, that cancer is a single disease, comparable to tuberculosis. This assumption appears to be untenable. Cancer is not a single pathological entity, but a great group of diseases of varied origin and course."

The executive session opened on Tuesday morning with an admirable address by Sir John Bland-Sutton, delivered without notes, on The Value of Coordinated Effort Among Surgeons and Pathologists and Others in the Control of Cancer. It was an eloquent plea for open-mindedness in cancer research, which should include many fields. He emphasized the importance of biochemical studies. In closing, he quoted the well-known saying of Sir James Paget: "It matters not who does the thing so long as the thing is done."

The theory that cancer is of germ or infectious origin was severely and ably attacked by Dr. Francis Carter Wood of New York and also by Dr. Gustav Roussy of the University of Paris. Among the objections to this theory offered by Dr. Roussy were: (1) that it was supported by "quacks" who thrive on the gullibility of the public; and (2) "A large number of bacteria, parasites or fungi have been described as the specific etiological agents in the causation of cancer. These researches have not withstood the test of time and have been largely forgotten. However, a few modern writers have recently been working again along this line." Dr. Roussy claims that, "Those who at present uphold the infectious theory make use of a method which consists of isolating a certain factor from a fragment of

tumor or from the product of its grinding or filtration, attempting to cultivate this factor in a suitable medium and, finally, trying to produce a new tumor by animal inoculation."

At the Mohonk conference, only a feeble voice was raised in favor of the microbic or infectious nature of cancer, and that, on the part of Dr. Erwin F. Smith, Professor of Plant Pathology, of the U. S. Department of Agriculture. However, Dr. Henri Hartmann of Paris held that all should retain an "open mind" on the question until the problem was solved.

Until it is settled beyond the shadow of doubt that cancer is not due to a microorganism, we believe that every effort should be made to stimulate to the utmost cancer research along these lines rather than to attempt to hinder or to discredit it.

It was curious to note that on the very page of one of the leading daily newspapers containing reports of the papers of Dr. Wood and Dr. Roussy in which they emphasized that, in their opinion, cancer cannot be due to a germ or parasite, there appeared an article entitled: Cancer Parasites Bred and Observed Under Microscope. It stated: "Announcement by Professor A. Binz and Dr. C. Raeth, of Berlin, before the German Scientific Congress here [in Dusseldorf, Germany] today that they have discovered an easy way of breeding cancer parasites and seeing them under the microscope is believed by German scientists to mark an important step forward in the fight against the baffling disease." After describing the method of cultivating these organisms, the article continued: "With the transference of such parasitic cultures, Professor Binz and Dr. Raeth succeeded in introducing cancer into animals. Professor Binz said he believed the cancer parasites he has discovered belong to the same kind as those found by Professor Blumenthal, and that the virus discovered last year by the English investigators, Gye and Barnard, arises from these parasites."

Although the American Society for the Control of Cancer was founded more than a decade ago and many of the European societies were organized very shortly afterward, the fact that relatively small progress has been made thus far in the control of the disease was especially brought out in an able paper by Dr. Louis I. Dublin, PH.D., statistician of the Metropolitan Life Insurance Company. Dr. Dublin stated that the death rate in cancer has increased in the last fifteen years; that the probability of a ten-year old boy dying ultimately from the disease is today 47.3 per cent greater than it was fifteen years ago, while in the case of a ten-year old girl, the chances had increased 21.4 per cent. According to Dr. Dublin there can no longer be any doubt that cancer is one of the greatest causes of disability and death. He bases his opinion on an analysis of 125,000 deaths from cancer between 1911 and 1925, occurring among the many million industrial policy holders of the Metropolitan Life Insurance Company.

Dr. Dublin's opinion was upheld by the investigation of Dr. Scheroschowsky of the United States Public Health Service, and also by the studies of Dr. Frederick L. Hoffmann, consulting statistician to the Prudential Life Insurance Company.

It is both interesting and alarming to note that this rapid increase in the death-rate from cancer has been coincident with the formation of the great international organizations for the control of cancer, and, apparently, that it is but little modified by the greatly improved methods in the early diagnosis and treatment of the disease.

We believe that the American Society for the Control of Cancer should use at least a part of its funds in conducting or in stimulating hospitals to conduct studies of end-results of surgery and radiotherapy. Such surveys have already been instituted by the London Ministry of Health under the able direction of Sir George Newman. What is still more important, we believe, is, that the Society should institute a careful survey of the geographical distribution of cancer especially in countries in which the disease is usually prevalent or nearly absent. The assertion made by Sir Arbuthnot Lane and J. Ellis Barker, of England, and others, that, cancer is almost unknown among the natives of India and yet it has the same mortality among the Anglo-Indians as obtains in England itself, and that the native Indians who adopt the habits of living and especially the diet of the English have the same high cancer rate, is one of vital importance and should be either corroborated or disproved. If it is found to be true then it is evident that there must be some factor, possibly biochemical, which changes to a remarkable degree the individual's susceptibility or resistance to cancer. The discovery

of such a factor would be of great value in the prevention if not in the cure of the disease.

The one thing above all others that was impressed upon the minds of those who were fortunate enough to be present at the Mohonk meeting, was the fact that, in spite of all our splendid organizations, and in spite of all our improved methods of diagnosis and treatment, we are still pitifully lacking in our ability to control this dread disease. We agree with Dr. Bastianelli that until we discover the cause of cancer no great advance in the control of the disease can be reasonably expected. To those of us who believe that cancer is of infectious nature and due to some microbic organism or group of closely allied microorganisms, the discovery of such cause or causes offers the only real hope of solving this greatest of medical problems.

COMMENT AND CORRESPONDENCE

CAUDAL ANESTHESIA

Editor, AMERICAN JOURNAL OF SURGERY,

In your issue of June, 1926 appears an article by David C. Elliott, M.D., entitled "*X*-Ray Studies on Caudal Anesthesia and the Intravenous Absorption of Substances Injected into the Sacral Canal."

As I carried out a somewhat similar series of experiments in 1924 and published my results in *Archives of Surgery*, March, 1926, and as these experiments are to some extent corroborated by the findings of Dr. Elliott, I crave your indulgence while making the following comments.

While it is probably true that in the unembalmed cadaver definite amounts of fluid injected into the epidural space through the sacral canal will reach approximately similar levels in individuals of the same size, we must bear in mind that in the practical use of sacral anesthesia other factors must be taken into account. It is patent that in the cadaver, especially after rigor mortis has become established, the dissemination of liquids will differ to some extent from the phenomena which take place when similar fluids are injected in the living subject. Furthermore, it is obvious that isotonic solutions will be absorbed more rapidly into the tissues of the living subject than will solutions that are not isotonic.

From the practical standpoint clinical experience shows that the height reached by anesthetic solutions injected into the sacral canal depends upon a number of factors and cannot be definitely estimated by the amount injected. The force of gravity and the rapidity with which the fluid is injected will both influence the result. With the patient in the Trendelenburg position an isotonic solution will be found to reach a higher level than when the prone or reverse Trendelenburg position is assumed while the injection is being made. It will be found, also, that anesthesia may be noted at a higher level when the injection is made in, say five minutes, than when twenty minutes are allowed to elapse during the introduction of a given amount. The reason for this is obvious. The slow injection permits the dissemination of the solution upward along the epidural space where the resistance is comparatively slight. Between 1916 and 1918 we determined to our own satisfaction that with a standardized technique, the level reached by the anesthetic varied in different individuals. This is probably due to the fact that the epidural space varies somewhat in size in different individuals and that the anesthetic effect may differ to some extent in one person as compared with another.

The point made by Dr. Elliott in confirming the observation of Thompson that there is danger of injecting the solution into the venous system is an extremely important one. It is probably true that this accident may follow the rupture of a vessel wall. The only safe procedure is to aspirate frequently while the injection is being made, and to desist at once provided blood-stained fluid is withdrawn.

Since our experiments were made in 1924, it has been our practice to use smaller amounts of the more concentrated solution (novocain, 30 to 60 c.c. of 1 per cent to 2 per cent solution) where the anesthetization of the sacral nerves only was the main objective.

The injection of tetro-iodo-phenolphthalein employed by Dr. Elliott in the living subject is extremely ingenious and the results obtained are most interesting.

ROBERT EMMETT FARR, M.D.

MINNEAPOLIS,
July, 12, 1926

STRANGULATION OF A HERNIA SAC

Editor, THE AMERICAN JOURNAL OF SURGERY,

In your comment on my article on Gangrene of a Hernial Sac, both of which were published in the August issue of the JOURNAL (p. 103, p. 108) you state "I make no mention of fluid within the mass; observation of analogous conditions would lead us to expect that if gangrene of the sac were caused by strangulation (which, however, Miller does not assert) it would contain serous or sero-sanguinous fluid." This is quite true where the gangrenous sac contains a strangulated intestine or omentum. However, in the fourth paragraph of my article I stated explicitly "there was no discharge of any kind from this incision . . . " Of course not, for the opening at the neck of the sac leading into the abdominal cavity was about the size of a silver quarter; and further-

more, the sac did not contain anything like intestine or omentum that would have caused an exudation of fluid.

In all my previous operations, where I had encountered a strangulated intestinal or omental hernia, there was always fluid present upon opening the sac.

The only explanation of gangrene of the sac in the case I reported that I can venture is that an intestinal hernia did occupy the sac, and being more viable than the sac, did not become gangrenous, but by pressure against the neck of the sac around the ring caused the rapid change in the sac which I encountered; and when the intestinal hernia slipped back—as I assumed in my article—it allowed the fluid to gravitate back in the abdominal cavity.

In Dr. Coley's comment that "it is still more improbable that a portion of strangulated bowel could have produced gangrene of the sac without first having become gangrenous itself; and if such portion of the intestine had been reduced, it certainly would have produced a peritonitis," all experiences so far would warrant this conclusion. However, the proof that there was not gangrene of the intestine is that the subject did not develop a peritonitis and is alive today.

I cannot agree with Dr. Coley that I might have had a "gangrenous appendix glued to the sac." In the first place, as I before stated, the neck of the sac at the ring had an opening about the size of a silver quarter, and careful examination did not lead me to the cecum.

Of course, "it is very difficult to give a rational explanation of the case" any more than my personal deduction that a gangrenous mass existed, that it was an empty sac, was removed and no fatality resulted. It is this very condition that makes the case unusual.

The mass, in order to become gangrenous must have had a blood supply. My hypothesis is that this blood supply was furnished by the omentum becoming agglutinated to the sac. Assuming, then, that this was the case, the viability of the sac being much lower than that of the incarcerated intestine it caused the rapid change in the sac before the bowel slipped back into the abdominal cavity.

H. T. Miller.

Springfield, O.
September 26, 1926.

THE AMERICAN JOURNAL OF SURGERY

EDITORIALS

GAS GANGRENE

In the recent world conflict of arms the conditions of warfare—living and fighting in muddy trenches dug in richly fertile soil, with scant opportunity for change of garments, and the use of high explosives driving irregular metal fragments into the body—produced a very common, desperate form of wound infection—"gas gangrene" —with which neither previous wars nor the scattered experiences of civil surgery had prepared us to cope. While this type of infection varied in its rapidity of development and, in a measure, in its virulence, it was practically always fatal unless recognized early and dealt with vigorously. In its fulminant form it spread in a few hours over a large part of the body, with green discoloration of the skin and with the production of much gas and of massive gangrene.

In many instances radical amputation was required in an effort to save life and where this was not possible or not necessary the spread of the infection was combated by extensive, often ruthless, sacrifice of infected muscles. Even these heroic measures were very often futile. A large percentage of the deaths among the wounded was due to gas gangrene, and most of those who recovered from it did so at the cost of mutilation. Those battle stricken who, by reason of delay in getting aid or from the character of their injury, were in great shock when they reached a hospital, could not be operated upon at once; and when, several hours later, some of these had sufficiently recovered, their gas gangrene infection had spread so far that even primary amputation or extensive removal of muscles failed to save life. The "shock tents" and "operating shacks" of our forward hospitals reeked with the odor of putrid flesh! The prayerful plea for a remedy more certain and less mutilating than the knife went up from surgeons' saddened souls as year after year the loss of limb and life went on!

Welsh's bacillus—the *bacillus aerogenes capsulatus*, also called *bacillus perfringens* (Veillon), is the organism most commonly found in gaseous gangrene and, in this country especially perhaps, that anaerobe was regarded as the essential and responsible infecting agent. Accordingly, in 1917 Bull and Pritchett, in the Rockefeller Institute, developed an antitoxin for the *bacillus Welchii* which, in animals injected with cultures of the bacillus, worked, prophylactically and therapeutically, with a specificity as precise as a demonstration in physiology or a reaction in chemistry. With hopes, amounting to expectation, that the prevention and cure of gas gangrene war infections had been found, this antitoxin was taken to France—where it proved a lamentable failure.

French bacteriologists determined that in the gas gangrene of the battlefields the *bacillus aerogenes capsulatus*, which Vincent found in 82% of cases, was associated with other bacteria—Pasteur's *vibrion septique*, Weinberg and Seguin's *bacillus oedematiens*, *bacillus histolyticus*, and *bacillus fallax*, Vincent's *bacillus fusiformis*, and often 'other anaerobes ordinarily regarded as indifferent saprophytes but which Vincent nevertheless considers as exerting an important associated action in the evolution of the gangreno-gaseous process.' Often, too, there was an active association of aerobes—*bacillus coli communis* and pyogenic cocci, whose effect upon the tissues prepared these for the action of the anaerobes. "The most important of these microbes, the *bacillus perfrin-*

gens and the *vibrion septique*, may multiply alone in the muscles, but the association of these microbes gives them an activity and a toxicity of still greater magnitude. If one inject separately into two guinea-pigs in the muscles of the thigh the *bacillus perfringens* and the *vibrion septique*, attenuated by a long cultivation in the laboratory, one is not always able to produce the gangrene. But if one inject the mixture of each of these with *bacillus sporogenes* (this last anaerobic microorganism is non-pathogenic) and, *a fortiori*, if one inject the mixture of these three microbes, one is able to produce the phenomenon of gaseous gangrene" (Vincent and Stodel).

The gas gangrene of the Western Front was thus an "acute putrefaction of the tissues in vivo" produced by a symbiosis of various bacteria. The symbiont lytic and gas-forming processes are briefly but clearly described in Gage's excellent article on Gas Gangrene in this issue of the JOURNAL.

It became evident that a serum potent against gas gangrene must be polyvalent, containing the antitoxins of several of the infecting organisms. Towards the very end of the war Weinberg and Seguin, working in the Institut Pasteur, evolved such a potent polyvalent antitoxin. In the last week of October, 1918 returning, with the stench of gas gangrene in our nostrils, from service at an evacuation hospital, we saw Chutro, in Paris, demonstrate on successive days the beneficent action of Weinberg and Seguin's serum in desperate cases of gas gangrene. A few days later came the armistice; and when some of the serum was secured in an American base hospital the opportunity to use it had passed. Earlier Professor Vincent, in his laboratory at Val-de-Grace, with the collaboration of G. Stodel, had also evolved a polyvalent antitoxic serum* by injecting into horses twenty strains of species of microbes, including *bacillus perfringens*, *vibrion septique*, *bacillus oedematiens*, *bacillus histolyticus*, *bacillus fallax*, *bacillus sporogenes*, *bacillus putrificus*, etc. The curative and prophylactic power of this serum was demonstrated in a number of cases in the war in some American and French forward hospitals. There was, however, only limited production and distribution of this antitoxin then, but it has since been used in large quantities in French campaigns in Cilicia, Syria and Morocco, especially in preventive doses. Vincent has also urged its use* as a prophylactic in all injuries for which one would inject tetanus antitoxin, and in the treatment of Ludwig's angina, paraintestinal phlegmons, pulmonary gangrene and certain fetid genital and urinary tract infections.

In this country instances of gas gangrene, though relatively few, are by no means rare. Now, especially, that we have learned to recognize the condition the cases are seen to be, in the aggregate, at least sufficiently numerous to demand adequate provision for their treatment. Thus, Gage reports four cases in four years in a single hospital service; and we, too, have had four cases in five years in an individual service. Usually produced by contamination from the soil, sometimes from feces, the distribution of these anaerobes is uncertain. Gage's report of finding the *bacillus Welchii* in clean woolen clothing and even in untailored woolen cloths, is a striking one and, if corroborated, it means a far wider distribution of the germ than had been supposed, and a grave danger of gas gangrene in cases of crushing and penetrating injury, through woolen garments, especially when there is much damage to the local blood supply.

As Gage states, there is no useful gas gangrene antitoxin obtainable in this country—not even in the Army laboratory in Washington. The only serum that is available here is a mixed tetanus and perfringens antitoxin. While recoveries have been reported in cases in which it was used

* *Comptes Rendues de l'Academie des Sciences*, July 16, 1918, CLXVII, 137. See also *International Clinics*, 1925, IV (December).

* *International Clinics*, 1926, II, June; the JOURNAL, August, 1926, 109.

in conjunction with surgery, our experience in four cases in which it was administered in liberal doses was that it exercised no control whatever over the infection and, indeed, in at least two of the four it appeared to hasten death by anaphylaxis.

We have written this editorial note in the hope that it may stimulate the importation into, or the production in, and the distribution through, this country of a tested polyvalent antitoxin with which we may cure our cases of gas gangrene infection.—W. M. B.

"DÉBRIDEMENT"

A consideration of gas gangrene suggests also a note concerning a foreign word that is much used in discussions of its treatment and which, indeed, has become quite familiar in English in the literature of traumatic surgery in general, viz., *débridement*. In the World War it was borrowed from their French colleagues by British and American military surgeons and by them misapplied to describe the operation that had developed of attempting to sterilize a war wound by excising all contaminated tissues—an operation also and especially applied boldly, indeed ruthlessly, in efforts to combat gas gangrene infection. That operation, which we have been calling "débridement" and "débriding," and which, in English terms, has also, though somewhat inadequately, been called "wound excision," is, properly, *épluchage*.

The French *bride* means bridle; *brider*, to bridle; *débrider*, to unbridle. By *débrider* and *débridement* the French surgeon means the unbridling, the release, by incision, of restricted or constricted tissue. Thus the division of restraining adhesions, the incision of a paraphimosis is débridement; and in the war the French used the term especially for the free incision of skin and fascia to release the tension in wound-contaminated muscles—which was a step in the development, and is often an important step in the performance, of *épluchage*.

Stedman's Medical Dictionary does not contain *épluchage*, and it defines *débridement* as "1. Division of constricting or restricting bands. 2. Cutting away a zone of contused or infected tissue from a wound surface." The American Medical Dictionary defines *débridement* and *épluchage*, synonymously, as "wound excision; the cutting and paring away of the contused and contaminated tissues of a wound." It is probably altogether too late to attempt to make English-speaking surgeons substitute the correct French term for the more familiar one; and, indeed, such an attempt might cause confusion. On the other hand, if a surgeon writes that he performed a débridement of the muscles for gas gangrene he should expect French readers to understand thereby that he merely incised the skin and fascia over the muscles.—W. M. B.

PROGRESS IN SURGERY

Selections from Recent Literature

INTRATRACHEAL ANESTHESIA. Stanley Rowbotham, England. *The Lancet*, September 18, 1926.

Rowbotham concludes:

(1) Intratracheal anesthesia is the method of choice for all operations upon the head, nose, mouth or throat, where the anesthetist cannot maintain a satisfactory anesthesia and a free airway by the ordinary methods without seriously interfering with the surgeon.

(2) When there is blood in the upper air passages it is a necessity—effectively preventing its entrance into the bronchi and air cells, and lessening the liability to pulmonary complications. In double or single intubation we have a refinement which is of great help to the operator in shutting off the air passages and giving him a clear field for operating.

(3) In intrathoracic operations where normal respiratory mechanism is interfered with, double intubation enables one not only to maintain respiratory exchange, but to regulate the collapse of the lung, and so save the patient much shock.

THE USE OF ETHYLENE IN OBSTETRICS. A REPORT OF EIGHTY-FIVE CASES. Joseph Kreiselman and Howard F. Kane, Washington. *Surgery, Gynecology and Obstetrics*, September, 1926.

Complete analgesia was obtained in 84 per cent of cases, appreciable relief from pain in 13 per cent, and failure in 3 per cent. Progress during the second stage of labor seemed to be more rapid. No harmful effects on the child were noted.

Podalic version was easily performed under ethylene anesthesia. Ethylene seemed to be the ideal anesthetic for cesarean section. The efficacy of ethylene seemed to be increased by the use of morphine in the first stage.

Ethylene is valuable in the second stage of labor because with it analgesia and anesthesia are rapidly induced; its action is fleeting; there are apparently no latent ill effects on the mother or child.

BRONCHIAL DILATATION. (*Dilatation bronchique*). Albert Reverdin. *La Presse Médicale*, August 14, 1926.

Reverdin observes that chronic bronchiectasis is the only form of bronchial dilatation amenable to surgical treatment. Lobectomy is the only operation that offers the hope of permanent cure. However, in cases associated with pulmonary abscess, pneumotomy with drainage of the abscess cavity is the procedure of choice. He reports a case of this sort in which pneumotomy with injection of lipiodol directly into the abscess cavity resulted in cure. Because of the fact that the bronchi even though diseased are covered with an epithelial lining, he is of the opinion that thoracoplasty and phrenicectomy act merely as does pneumothorax to diminish the size of the cavities rather to effect a cure of the condition.

A LECTURE ON INJECTION-TREATMENT OF VARICOSE VEINS AND THEIR SEQUELAE (ECZEMA AND ULCUS CRURIS), CLINICALLY AND EXPERIMENTALLY. V. Meisen, Copenhagen. *Acta Chirurgica Scandinavica*, Vol. LX, Fasc. IV–V.

The effect of injecting strong hypertonic solutions of salicylate of sodium (20–50 per cent) in the veins was studied on horses. A red thrombus forms immediately firmly adhering to the intima of the vessel, in the coat of which appears filling of the vasa vasorum, edema and bleeding in adventitia. After 24 hours the thrombus is compressed like a wax cast and can be removed only by instruments. On the 6th day organization begins.

In patients where a marked dilatation of the femoral saphena is found, sometimes an ascending phlebitis of chemical nature is to be seen, either with or without thrombus-formation. Embolus is never seen and this accident is not likely to happen on account of the very firmly adherent thrombus and the *ambulatory* treatment.

The patients should always be examined while standing on a low table or high chair in order to present a good view of the functional condition of the varicose veins and their possible connection with degenerations of the skin) eczema or ulcer). The injection is, as a rule, best begun at the inner side of the tibial condyle, where several tributaries meet and the tension is often at its highest. The needle is introduced while the patient is standing and some drops of blood are drawn to make sure that one is in the varix. The patient is now asked

to lie down, the leg is elevated and 3 to 10 ccm. of the fluid are injected. The skin and surroundings of the varix are immediately afterwards infiltrated with about 10 ccm. of physiological sodium chloride solution to neutralize a possible leakage of the vein. A gauze pad and an elastic web bandage of the whole leg is applied (while the leg is still elevated) and will have to be worn until the next injection—as a rule two days later.

The only inconvenience of the treatment is necrosis caused by the unfortunate evacuation of the syringe *outside* the vein. It is without danger but of long duration and disagreeable. It ought to be absolutely avoided.

Fifty cases have been treated, all with complete success. Chronic eczemas and ulcers, ten to twenty years old, have been completely cured. No relapse after three-fourth years observations.

The author advances his theory that "eczema" and "ulcer" are only stages of degenerative changes in the skin, due to local areas of varicose veins in the close vicinity or at bottom of the ulcers; sometimes these are the only varicosities present often invisible and only to be found by close palpation with the patient resting on the diseased leg.

The injection treatment has a wider scope, is more convenient and seems to be much less risky than operative treatment. The varicose veins ought to be treated at an earlier stage than hitherto, at any rate as soon as the complications—the eczema and ulcer—appear.

Muscular Rigidity with and without Sympathetic Innervation. A. Forbes, W. B. Cannon, J. O'Connor, A. McH. Hopkins and R. H. Miller, Boston. *Archives of Surgery*, September, 1926.

As a result of their experiments, these authors find that the theory that "contractile" and "plastic" tonus in skeletal muscle are two distinct functions, depending respectively on the cerebrospinal, medullated nerve fibers and on those arising from the sympathetic chain, is without adequate experimental foundation, and, in its extreme form, is inconsistent with the known facts of nerve-muscle physiology. Accordingly they dispute that there is a physiologic basis for the surgical operation of ramisection as a cure of spasticity, which was introduced by Royle and Hunter.

A Clinical Study of 120 Cases of Thromboangiitis Obliterans among Japanese. (*Étude clinique de 120 cas de Thrombo-Angiitis Obliterans chez les Japonais*). K. Koyano, Nagasaki. *Bruxelles Medical*, July 25, 1926.

Among 120 cases of thromboangiitis obliterans occurring in Japanese, the author made the following clinical observations. Only one of these patients was a woman. Over 81 per cent of the cases developed between the second and fourth decades. By far the largest percentage (83 per cent) occurred in laborers, many of whom were objects of charity. It is pointed out that the main articles of diet among these people are rice and leguminous foods. The blood of such patients has been shown by Koga to contain a higher percentage of calcium than is found among Europeans and Ito has suggested a relationship between the diet and the appearance of these presenile gangrenes. The Wassermann reaction was negative in all but five cases. All were heavy smokers and all showed the characteristic localisations and lesions of thromboangiitis obliterans. There appeared to be no appreciable difference between the normal Japanese and those suffering from the disease either in CO_2, cholesterin or sugar content of the blood. There was, however, a very marked increase in the blood viscosity above the normal.

In Koyano's opinion, antiluetic treatment, arterial sympathectomy and the hyperemia treatment of Moskowicz are all of only transitory value. The only partially satisfactory treatment has been the intravenous injection of Ringer's solution. Since the introduction of this therapy in 1909, the author has had occasion to practice only one amputation in the upper part of the limb affected. Of 85 thus treated, 7 had recurrences within a period of 5 years.

Iodized Oil as an Aid in the Diagnosis of Chronic Sinusitis and of Maxillary Cysts. Paul B. MacCready. The *Boston Medical and Surgical Journal*, September 2, 1926.

For injection into the antrum, a trocar is inserted and the antrum is irrigated with sterile normal saline solution as in the usual manner, in order to wash out any free pus. Care should be taken that all the saline solution is removed as the iodized oil is insoluble in water. Several

cubic centimeters (approximately 5 cc.) of 10 per cent iodipin are injected into the antrum through the trocar using a small rubber bulb such as an ear syringe. The exact amount gotten into the antrum cannot be determined and is unimportant if the patient remains upright because of the great variations in the size of the antrum. Roentgenograms are made as soon as possible after the injection. Stereoscopic views are made in the antero-posterior and lateral positions.

For injection into the frontal and sphenoidal sinuses a small silver catheter is used in place of the trocar and a similar technique carried out. Usually catheterization of these sinuses can be done only after a part of the middle turbinate has been removed. The ethmoid sinuses cannot be injected but much can be learned from the course of the iodized oil in the nose as it passes back into the nasopharynx. Normally the cilia carry it back into the nasopharynx very rapidly and in definitely established currents.

Sinusitis is a mucous membrane infection and not an osteomyelitis. With the subsidence of an acute infection the mucous membrane returns to normal. In chronic sinusitis the mucous membrane is thickened. *It is this thickening of the lining membrane of the sinuses which gives the diagnosis of an existing sinusitis.* Its presence is readily demonstrated by the *x*-ray through the use of an opaque medium such as iodized oil.

Iodized oil will show the amount of polypoid degeneration and thickening of the mucous membrane of the sinuses and in that way indicate the existence of a chronic infection. It is entirely free from untoward effects when used as an opaque medium in the roentgenographic study of the paranasal sinuses.

THE PREVENTION OF SO-CALLED BATHER'S EAR. George B. McAuliffe, New York. *Medical Journal and Record*, September 15, 1926.

Bathers should not swallow water while swimming because swallowing opens the tubes and the water may gain entrance into the middle ear. This effect is similar to that of a faulty use of the nasal douche. When bathers come out of the water they should let the water drain from the nose. Blowing should be avoided. If blowing the nose and swallowing are interdicted no ear complication will occur. The only time an occlusive protector is necessary is when there is an open perforation or when the skin of the canal is irritated by the water. Rubber plugs or wool are the best protectors.

CANCER OF THE MOUTH: THE RESULTS OF TREATMENT BY OPERATION AND RADIATION. A Study of 376 Cases Observed at the Massachusetts General and Collis P. Huntington Memorial Hospitals in the Three-year Period, 1918–1920. Channing C. Simmons, Boston. *Surgery, Gynecology and Obstetrics*, September, 1926.

In primary cases without clinical evidence of metastases, surgical treatment offers 35 per cent chances of permanent cure as against 15 per cent by radiation treatment.

In primary cases with clinical evidence of metastases, radiation treatment offers no chance of permanent cure and radical surgical treatment not over 5 per cent.

The degree of malignancy varies somewhat as to the situation, cancer of the cheek and upper jaw being less malignant than cancer of the tongue or floor of the mouth. This is probably due to the fact that the papillary type is more common in the former positions.

In the early cases, comparatively little reliance as to metastases can be placed on the presence or absence of palpable glands.

A certain group of cases which may be said to have been "cured" by treatment are prone to develop a second cancer at some other point in the buccal mucosa.

The results of treatment depend more on the amount of differentiation of the cells, as determined by the microscopic examination of the specimen, than on any other one factor.

AN EXTRAPERITONEAL TRANSDIAPHRAGMATIC ROUTE FOR LOWER INTRATHORACIC SURGERY. Minas Joannides, Chicago. *Annals of Surgery*, September, 1926.

Joannides describes and illustrates a technic for the transdiaphragmatic *extraperitoneal* route for surgery of the lower intrathoracic organs. It is a very desirable procedure in chest operations where one does not want to disturb the chest wall.

The distinct advantage of this procedure is the maintenance of an intact chest wall and thus no embarrassment of respiration follows intrathoracic operations.

Healing per primam occurs in the cut end of the diaphragm when the operation is done under aseptic conditions.

Empyema of the chest occurred in the experiments in which a septic technic was used.

A fair access can be obtained to the lower thoracic organs by means of this incision.

Transdiaphragmatic Hernia. (*Hernie transdiapbragmatique*). Pierre Z. Rhéaume, Montreal. *La Presse Médicale*, No. 50, 1926.

The author reports an unusual case of transdiaphragmatic hernia which was apparently due to some disease of the muscle fibers of the diaphragm. The cure was accomplished operatively through a combined thoracic-abdominal incision. The thoracic incision involves removal of the rib from the mid-axilla to the sternal margin. The abdominal incision is made in the epigastrium. Through this latter incision, the abdominal contents are reduced and through the thoracic wound the diaphragm is repaired. The repair is carried in the manner usual in the typical hernia operations using silk sutures for the plication of the muscle edges.

Some New Phases of the Physiology of the Biliary Tract. Evarts A. Graham, Warren H. Cole, Glover H. Copher and S. Kodama, St. Louis. *Annals of Surgery*, September, 1926.

1. The hypothesis of Meltzer of the existence of a contrary innervation between the gallbladder and the so-called sphincter of Oddi has little evidence to support it.

2. The opening and closing of the duodenal end of the common duct depend almost entirely upon tonus of the duodenum, and it is not necessary to assume a separate sphincter to control this mechanism.

3. The spurting of bile through the ampulla of Vater is due largely to the milking action of duodenal peristaltic waves upon the common duct which passes obliquely through the duodenal wall.

4. The emptying of the gall bladder is chiefly a passive phenomenon due to factors such as the elastic recoil of a distensible viscus and the gradual washing out of its contents by the ingress of fresh bile from the liver. Increased intraabdominal pressure is also a factor of some importance.

5. The gall bladder fails to contract when any of the experimental methods are tried that are known to induce violent contraction of either the urinary bladder or the intestine. Muscular contraction of its wall must therefore play an insignificant rôle in the emptying of the gall-bladder.

6. Those substances which are known to induce emptying of the gall bladder probably have this property by virtue of their ability to cause duodenal peristalsis. Oleic acid seems to be the most potent.

7. Cholecystography is a test of the only functions known to be possessed by the gallbladder. If the organ has been shown to be functioning normally, it almost certainly is not causing symptoms, even if at operation old evidence of disease is found, such as adhesions and scarring. Accuracy in interpreting normality, however, demands great care and experience in performing the test. The intravenous method of adminstration gives much more accurate results than the oral.

8. Phenoltetraiodophthalein possesses many advantages over tetraiodophenolphthalein, and the authors are now using it exclusively.

Association of Cholecystitis with Duodenal Ulcer. Herbert A. Bruce, Toronto. *Annals of Surgery*, September, 1926.

The coexistence of cholecystitis and duodenal ulcer is not rare and in operating for gallbladder disease examination of the duodenum should always be made.

In this series of six cases although both conditions were present, the symptoms of gallbladder disease predominated except in one case.

In making a diagnosis the clinical examination is much more reliable than the *x*-ray.

This series would seem to confirm Bruce's view that multiple operations in the abdomen, as too frequently practiced, are unwise and often unjustifiable.

Strictures and Operative Injuries of the Bile Ducts. John Douglas, New York. *Annals of Surgery*, September, 1926.

Twelve cases are reported.

Injuries to the bile ducts may occur in a simple operation or be due to pathological conditions rendering the operation difficult, or to congenital abnormalities of the ducts or arteries. Traction on the cystic duct, lack of visualization or blind attempts to stop hemorrhage are the most common causes.

The site of the injury is usually at the point of union of the cystic and hepatic ducts, or the main hepatic duct above this point, less commonly of the common duct.

The symptoms are those of biliary obstruction, with or without cholangitis, usually intermittent in character, the obstruction later becoming permanent. More rarely a persistent biliary fistula is present.

The pathological condition present may show a narrow stricture which is very short to 2 cm. or more in length, above which small stones, mucus or biliary detritus is often found. The ducts above the stricture are dilated and the liver is enlarged and soft, or may be cirrhotic when attacks of cholangitis have persisted.

Methods of repair are numerous and must depend on the condition found. Recurrence of symptoms are reported after all methods. Examination of follow-up reports appear to indicate that the best end-results follow suture of the ducts when possible. The next most favorable result where a number of cases are reported follow hepatico-duodenostomy.

Recurrence of symptoms may occur after the patient has been apparently well for months or years, or symptoms may disappear after several months of recurrence.

In two cases reported, the disappearance of late symptoms seemed to be influenced by the administration of bile salts.

STRICTURE OF THE COMMON BILE DUCT. E. Starr Judd, Rochester, Minn. *Annals of Surgery*, September, 1926.

Obliterative cholangitis resulting in stenosis of the common or hepatic duct is the cause of a considerable proportion of strictures of the common duct that have been classified as traumatic. These cases can often be recognized before the first operation. The symptoms are generally intermittent. Repeated operation is indicated if necessary.

Stricture of the common duct in which a biliary fistula exists may be deceptive in that there may be unexpected biliary cirrhosis. Careful study and any indicated preparatory treatment should be followed out in spite of the lack of jaundice.

Complete jaundice and severe biliary cirrhosis accompany the severance of the duct when the proximal end is closed. It is necessary to spend a great deal of time in preparing the patient for operation. It is also necessary to give much attention to the post-operative care.

Anastomosis of the stump of the common duct or the opening in the surface of the liver to an opening in the duodenum over a tube is the most satisfactory operation.

In certain cases recurrence of symptoms follows operation for stricture of the common duct. If these symptoms persist and increase, further operation is indicated and with some prospects of permanent relief.

CONGENITAL ATRESIA OF THE BILIARY PASSAGE. (*Über angeborene Gallengangsatresie*). Helene Schuster, Lemberg. *Frankfurter Zeitschrift für Pathologie*, Vol. XXXIII, Part 3, 1916.

The author reports two cases of so-called congenital atresia of the bile passages with complete clinical and pathological findings. She is of the opinion that this condition is due to an infection ascending from the duodenal region either in the periductal tissue or along the lumen of the bile passages. Because of the embryologic development of the liver and biliary ducts from an outgrowth of the intestine, a true congenital agenesis of any part of the ductal system without a coincident absence of the liver or gallbladder cannot be conceived.

THE OPERATIVE MANAGEMENT OF COMMON DUCT STONES. George W. Crile, Cleveland. *Annals of Surgery*, September, 1926.

Clinical experience and experimental researches make it clear that operations upon the common duct require a wide regional block with novocain and, when feasible, a splanchnic block; a clear exposure; a sharp feather edge dissection; and a bloodless field, a suction apparatus being used to pick up bile or any oozing of blood. Such a technic meets the factor of nerve injury in common duct operations extremely well.

Nerve injury may be produced, however, after the operation by drainage. There is no excuse excepting absolute necessity for the introduction of a drain of any kind into the field of the sympathetic ganglia and sympathetic nerve fibers when a better drain can be placed in the right flank termination in Morrison's pouch.

Another factor of danger is the drainage of the common duct itself. Sudden decompression of bile in a jaundiced patient may have the same effect on liver function as the sudden decompression of urine in the case of obstruction of the urinary system. The normally closed biliary system maintains adequate bile pressure within the system, therefore instead of draining

the common duct Crile closes it. The function of the bile with its high alkalinity, when its pressure is maintained at a normal degree, is to maintain the alkalinity of the liver cells.

Faulty drainage may produce a well instead of a stream. Too much fluid may accumulate before its escapes, with immediate resultant functional disturbance and the more remote result of adhesions, which in turn interfere with liver function and consequently with general organic function. This drainage is met or largely eliminated by employing gravity drainage through Morrison's pouch. Crile has found that the introduction of heat within the abdomen causes an immediate rise, not only in the temperature of the liver, but also, synchronously, in the temperature of the brain. The application of heat to the liver should in large part counteract the effect of operations upon the liver and bile ducts. Crile has been applying heat to the liver by means of diathermy. One plate of the diathermy apparatus is placed on the lower chest on one side and the other is brought opposite the dome of the liver. The current can thus be continually applied during the operation and the temperature of the liver and the abdominal viscera can be maintained at or above the normal throughout the operation regardless of the exposure of the intestines; moreover, the application of the diathermy current during the immediate postoperative hours is of great aid in carrying the patient through that critical period.

Hydrops of the Gallbladder in an Infant. Henry Milch, New York. *Annals of Surgery*, September, 1926.

Hydrops of the gallbladder in young subjects, and especially in children, is rare. Milch reports an instance in an infant 16 months old, in which the diagnosis was made before operation, and in which the condition developed during an encephalitis. No stone or actual obstruction in the ducts was found at operation or postmortem.

Intussusception and Its Treatment by Hydrostatic Pressure: Based on an Analysis of 100 Consecutive Cases so Treated. P. L. Hipsley, Sydney. *The Medical Journal of Australia*, August 14, 1925.

Whether plain warm water or saline solution is used does not matter much. The height of the head of the column must not exceed three feet six inches and in the majority of cases it did not exceed three feet. An ordinary glass douche is quite suitable, but a graduated vessel enables one to watch the progress of the saline solution more closely, as it runs very slowly after portion of the intussusception has been reduced. The injection is given through a No. 15 rubber catheter which is passed into the bowel for seven and a half or ten centimeters (three or four inches) and then the buttocks are pinched closely round it to prevent any escape of the saline solution. It is important not to use vaseline or other lubricant on the catheter, as they make the buttocks so slippery that it is difficult to hold the catheter in. The fluid runs in quickly at first, then more slowly as the intussusception is being reduced and then after a short cessation it may run slowly on again, as the fluid passes into the small bowel and gradually distends it. If the pressure is kept up it may pass right up into the jejunum.

In the whole series of one hundred and five patients there were seventy males and thirty-five females. Out of one hundred consecutive intussusceptions sixty-two were reduced by hydrostatic pressure. In forty-four of these an operation was performed and amongst these cases there were ten in which the duration of the intussusception was over twenty-four hours, three over forty-eight hours and one over three days.

The average duration in these cases was over sixteen hours.

In eighteen out of the sixty-two cases a small incision was made to confirm the diagnosis of reduction. In two of these the duration was over three days, the average being over seventeen hours.

In only thirty-eight out of the hundred cases was there a failure to reduce the intussusception and in these the average duration was 25.8 hours, that is after excluding the case in which the duration was three weeks.

Hipsley did not include in this series any case in which he could not feel a tumor before treatment.

Conjugal Ulcers of the Pylorus and the Stomach. (*Les ulcères conugés du pylore et du corps de l'estomac.*) X. Delore, P. Mallet-Guy et P. Ducroux, Lyon. *La Presse Médicale*, August 7, 1926.

In the statistics of the Mayo clinic, multiple ulcers occur in about 6 per cent of all the

ulcer cases. The authors of the present paper have studied a series of 38 cases in which multiple ulcers were found. They have observed that most frequently there is seen an ulcer of the juxtapyloric region associated with an ulcer of the lesser curvature. To judge by the state of healing of these associated ulcers, that in the juxtapyloric region is of earlier origin. The secondary ulcer appears to be located along the lesser curvature in tissue which the authors have demonstrated to be included in the inflammatory zone surrounding the first ulcer. They are of the opinion that even though the ulcer may have apparently healed, the mucous membrane, and the perivascular and perineural tissues still show evidence of the persistence of inflammation and represent the locus minoris resistentiae for subsequent ulcer formation. To this local cause, the authors believe another factor of general significance, the so-called ulcer diathesis, must be added to bring about the formation of secondary ulcers.

They recommend that every case submitted to operation for ulcer be carefully examined for the presence of more than the single apparent ulcer. Because of the extent of the inflammatory zone, gastro-pylorectomy is the procedure of choice. If this cannot be undertaken because of the presence of adhesions, etc., any of the other suggested operations may be performed.

Chronic Obstipation and Its Surgical Treatment. (*Chronische Obstipation und ihre chirurgische Behandlung*). Hans Finsterer, Vienna. *Wiener klinische Wochenschrift*, July 22, July 29 and August 5, 1926.

In an extended paper read before the Congress of Physicians, Finsterer maintains the thesis advanced some 20 years ago by Lane, that stasis in the colon may be responsible for many of the ills of man, even including carcinoma. Finsterer accepts Lane's theory of auto-intoxication and advises operation in cases of chronic constipation that have resisted persistent medical treatment. He differs from Lane in that instead of complete colectomy, Finsterer merely recommends the extirpation of the descending colon. In a series of 40 cases, 38 were cured, 1 died. Finsterer prefers the operation of partial colectomy partly because the operative mortality is distinctly lower, and also because in his opinion the seat of the trouble lies in the lower colon.

Duodenal Ileus. Joseph E. Adams, London. *The British Journal of Surgery*, July, 1926.

The appropriate treatment in most cases is duodenojejunostomy. In a few cases, however, there is so pronounced a kink at the junction of the first two parts of the duodenum that gastroenterostomy is likely to give the best results.

Multiple Polypi of the Colon. Sir W. I. de C. Wheeler, Dublin. *The British Journal of Surgery*, July, 1926.

There is a close association between ulcerative colitis and polyposis. Ulcerative colitis occurs in children as well as in adults. The majority of cases sooner or later become malignant. A condition of infantilism may result from polyposis of the colon in early life.

Polyposis of the colon cannot be diagnosed unless the polypi are seen or felt. Satisfactory *x*-ray and proctoscopic examinations are possible only in a proportion of cases.

When multiple polypi of a very diffuse nature are present in the colon there is a characteristic infiltration and want of flexibility in the walls which is unlike any other pathological condition. When handling the colon the increase in weight is very striking.

The prognosis is bad unless colectomy is performed. Ileostomy, cecostomy, or appendicostomy, followed by irrigation, has been successful in a few cases.

Treatment of Acute Suppurative Arthritis. Guy A. Caldwell, Shreveport, La. *Southern Medical Journal*, August, 1926.

Caldwell maintains that in well established acute suppurative arthritis:

Aspiration, with or without the injection of antiseptics, is inadequate.

Arthrotomy by one or more incisions, adequately large, is indicated as soon as diagnosis is made.

Intracapsular drains are dangerous and superfluous.

Immediate, active mobilization, following the arthrotomy appears to be unnecessary to say the least of it.

Since the results of the so-called Willems method are certainly no better than, if as good as, those in which arthrotomy has been followed by fixation, it would seem wiser to abandon it for the simpler, more logical, more truly orthopedic and surgical procedure of arthrotomy followed by fixation.

Two Cases of Stricture of the Bowel by Misplaced Endometrial Tissue. T. B. Mouat, Sheffield. *The British Journal of Surgery*, July, 1926.

While in particular instances the local lesions may require direct operative treatment, this is not generally considered necessary, and on recognition of the nature of the implantations the procedure should be directed against their source in the pelvic viscera. Sampson's usual practice is to remove the uterus and both ovaries and tubes, and to disregard the implantations (including intestinal) except as they may be easily removed for histological study. The ovaries are removed as they are a possible source of further implantations, and because their hormones tend to perpetuate the activity of any heterotopic endometrial tissue; while the uterus is often retroverted and adherent, and myomas or other pathological conditions may be present, which in themselves indicate its removal. However, in special circumstances, as, in young women who are anxious to have children, and in whom the disease is not extensive, he would be content with more conservative measures, and on occasion he has excised small endometrial deposits from the ovary.

Adenomyomata or Tumors Composed of Endometrial-like Tissue. Joe Vincent Meigs. *The Boston Medical and Surgical Journal*, August 19, 1926.

These tumors are made up of endometrial-like tissue and occur in numerous regions. The pelvic organs and their adjacent structures are most commonly affected.

They may become serious by invading and enlarging, causing intestinal obstruction and later death.

The "chocolate cyst" of Sampson is the most serious type. It may be responsible for the adenomyoma found in various organs.

Surgical removal of the adenomyoma itself is all that is necessary in some cases. In many with extensive pelvic involvement removal of the tumor and especially the ovaries is essential.

It is probable that removal of the ovaries causes atrophy and cessation of growth of adenomyomatous structures.

The diagnosis is difficult, but must always be thought of in considering conditions of the female pelvis.

A mortality of 11.9 per cent occurred in this series of 42 cases.

The lesions are often multiple.

Menorrhagia was the outstanding symptom, being present in 30 cases.

Intraabdominal Hemorrhage from the Ovary (Corpus Luteum). (*Intraabdominellen Blutungen aus den Ovarien (Corpus luteum)*. Fritz Beck, Bietigheim. *Zentralblatt für Gynäkologie*, July 31, 1926.

Beck reports a case that simulated appendicitis but in which at operation a large hemorrhage from a corpus luteum was found. The larger part of the ovary was removed and the patient made an uneventful recovery. The interesting points in this case are the absence of any increase in the temperature or in the pulse rate, the youth of the patient, 14 years, and the onset of menstruation two days after operation. The author is of the opinion that this condition is of more frequent occurrence than the literature would seem to indicate.

Isolated Tubal Torsion. (*Isolierten Tubentorsion*). Kurt Horsch, Offenburg. *Zentralblatt für Gynäkologie*, July 31, 1926.

A case is reported in which an acute appendicitis and a torsion of an apparently normal tube on the right side coexisted. Following removal of both affected organs, the patient made an uneventful recovery. The various theories advanced in the explanation of organ torsion are discussed. The author is of the opinion that the appendicular inflammation was to be considered as the etiological mechanism in causing the tubal torsion and inclines to the opinion that this latter condition is to be explained by Sellheim's theory. According to that writer organ torsions in general are caused by rotational movements imparted to the various organs by the normal physiological actions such as walking, dancing, etc.

The Association of Congenital Diverticula of the Fallopian Tube with Tubal Pregnancy. F. P. McNalley, St. Louis. *American Journal of Obstetrics and Gynecology*, September, 1926.

Of twelve cases of tubal pregnancy, diverticula were demonstrated in ten, or 83.3 per cent.

In three of the ten cases the malformation was directly responsible for the arrest of the ovum, and it probably was in the others.

In view of these findings, even in so small a series, it seems reasonable that diverticula are more common than is usually believed, and that they are an etiologic factor of considerable importance in the production of tubal pregnancy.

Uterotubal Roentgenography with Lipiodol. I. C. Rubin and A. J. Bendick, New York. *The American Journal of Roentgenology and Radium Therapy*, September, 1926.

Lipiodol should never precede per uterine gas insufflation but may follow the latter when three consecutive tests have demonstrated that the tubes are completely blocked or stenosed. Its use should be restricted to those cases where, the tubes having been shown to be closed, it is desirable to determine the exact point and type of closure in order to decide whether operative intervention may afford relief to the patient.

Rubin emphasizes the use of as little lipiodol as is necessary to achieve the result. To inject several cubic centimeters into the peritoneal cavity is unnecessary and causes needless risk of peritoneal irritation. Lipiodol remains for months unabsorbed in the tubes and although antiseptic it is at best a foreign body in the peritoneal cavity and may possibly be the cause of adhesions. In order to reduce the amount of lipiodol injected he decided to rely upon the sense of pressure obtained by the fingers rather than upon the manometric apparatus. The latter, in common use, has an air pocket which is subjected to high pressure. When the fluid is forced into the uterus and tubes and an obstruction is overcome the sudden expansion of the air is apt to force out an excessive amount of material into the peritoneal cavity—an accident which it is well, if possible, to avoid when the solution used is non-absorbable.

Lipiodol as an Adjunct to Tubal Inflation in the Diagnosis of Sterility. Lawrence M. Randall, Rochester, Minn. *American Journal of Obstetrics and Gynecology*, September, 1926.

The use of lipiodol offers a further means of accurately diagnosing tubal obstruction and stenosis as a cause of sterility. After inflation has shown nonpatency or stenosis of the tube, the site of closure or stenosis can be accurately detected by its use in connection with roentgenograms. Uncomplicated tubal occlusion is a frequent cause of sterility and the question of laparotomy is often brought up by the patient. If the site of closure can be located, one can much better judge the value of operation in a given case. Should the obstruction be in the narrowed portion of the tube the prospect of success from a plastic operation on the tube will not be good. With pathologic change at the fimbriated end, which is relatively common, and the lumen patent to this point, operation may be justifiable. It carries with it a fair chance of success, provided other conditions are normal.

The technic of injecting lipiodol is simple and involves no special apparatus. It is practically painless. The same care is used as in transuterine inflation of the tubes.

The Use of Iodinized Oil (Iodipin) as a Diagnostic Aid in Gynecology. Quitman U. Newell, St. Louis. *American Journal of Obstetrics and Gynecology*, August, 1926.

Summarizing his personal experience Newell says that iodipin injections will prove of diagnostic value:

1. In sterility cases where the tubes are found obstructed, to determine the character and location of the obstruction. It offers the opportunity to decide definitely whether or not the case is suitable for operation.

2. When several masses are palpable within the pelvis, injection and *x*-ray study will clearly differentiate the uterus from the other masses.

3. In cases in which the pelvis is blocked by one large mass, the precise diagnosis can be made whether the tumor is originating from ovary or uterus.

4. In cases in which a foreign body is suspected within or outside the uterine cavity.

5. Iodipin injections into the uterus are helpful in differentiating chronic appendicitis from a right-sided salpingitis, and a tuberculous salpingitis from common salpingitis, which means that they possibly might enable us to make a definite diagnosis of a tuberculous tube.

6. It is a valuable aid in indicating the size of the uterus, and in determining whether the the cavity is encroached upon by any masses such as a fibromyoma, a carcinoma of the fundus, etc.

7. Iodipin injections, carefully and skillfully done, are not likely to cause any harm.

PREGNANCY, PARTURITION AND HEALTH AFTER SURGICAL REPLACEMENT OF THE UTERUS—A RETROSPECT. Carmelo Reyes, Manila. P. I. *Surgery, Gynecology and Obstetrics*, September, 1926.

Surgical replacement of the uterus and minor associated procedures do not appear to affect unfavorably pregnancy, parturition and health. This is shown by the larger number of patients who have borne children (48 against 25 per cent), delivered normally (89 against 10 per cent), and reported to be doing excellently or enjoying better health after operation (61 against 39 per cent) than those who reported otherwise.

A larger number of patients is reported to be doing excellently or enjoying better health among those who continued or commenced bearing than those who ceased bearing children after operation (71 against 54 per cent).

THE ETIOLOGY OF CONGENITAL INGUINAL HERNIA AND ABNORMALLY PLACED TESTES. Richard H. Hunter, Belfast. *The British Journal of Surgery*, July, 1926.

The testis, processus vaginalis, gubernaculum, and fascial coverings can be lifted out of the scrotum of a newly-born infant without tearing anything but a little superficial connective tissue. The gubernaculum therefore is not attached to the skin of the scrotum, and the testis cannot be drawn from the abdominal cavity to the scrotum by its contraction.

The gubernaculum at first acts as a kind of anchor to the testis; its largest strand normally passes to the scrotal region in the human fetus and forms the path for the large growing cells which cause the growth of the processus vaginalis.

The processus vaginalis develops as a cone-shaped diverticulum of peritoneum, and, just before the descent of the testis, its apex normally reaches to the point of junction between the anterior abdominal wall and the scrotum.

During the descent of the testis the peritoneum, which is adherent to the proper fibrous tunic of the gland, is drawn down into the scrotum.

If the processus vaginalis is longer than normal before the testis descends, the excess of peritoneum present will become folded upon itself and form a hernial sac.

URETERAL DILATATION OF PREGNANCY. AUTOPSY FINDINGS. William J. Carson, Baltimore. *The Journal of Urology*, September, 1926.

Ureteral dilatation was found at autopsy in 16 cases of pregnancy, 12 bilateral, 14 unilateral.

Microscopical examination shows definite changes in all cases, bilateral.

Ureteral strictures—inflammatory in origin—were found in 3 cases.

LUCAS-CHAMPIONNIÈRE AND MOBILIZATION IN THE TREATMENT OF FRACTURES. John H. Gibbon, Philadelphia. *Surgery, Gynecology and Obstetrics*, September, 1926.

Gibbon says that fractures of the bones of the face, including those of the mandible, as a rule are better treated by daily molding than by fixed apparatus. The patient himself can be easily taught to carry out the necessary manipulation and if he does it a number of times a day, it is remarkable how soon and how easily the fragments come back to their normal relationship. The operation of wiring the fragments of the mandible is frequently followed by infection, necrosis, and delayed union. These complications are never seen when the molding method is employed.

What has been said of the jaw applies equally to fractures of the nose. Daily molding supplemented by the proper pressure frequently applied by the patient himself, will give far better restoration of contour. It is just as important to restore the internal contour as the external outline, but this too can be done best by molding with the finger or an instrument protected with rubber. Where there is marked depression and obstruction of the nares, a pack of gauze thoroughly impregnated with sterile vaseline left in place for about 48 hours and gradually removed is much better and less harmful than the rigid nasal splints. Dry gauze should not be used.

In the reduction of fractures, general anesthesia is rarely necessary. Muscular contraction can be overcome by traction or by massage and the deformity reduced gradually or with the use of very little force, and recurrence of deformity can be prevented by the same means. Employment of general anesthesia in the mobilization of joints and muscles after the fracture has healed is to be condemned.

ANATOMO-CLINICAL FORMS OF POTT'S PARAPLEGIA. (*Les formes anatomo-cliniques des paraplégies Pottiques*). M. Etienne Sorrel et Mme. Sorrel-Déjerine, Paris. *La Presse Médicale*, No. 50. 1926.

As the result of a careful study of the material at Berck, the authors believe they have been able to divide cases of paraplegia due to Pott's disease into three main groups with characteristic clinical pictures and pathological explanations. The first group is that in which the onset is rapid and the paraplegia complete. This occurs in cases seen within a short time of the development of the disease. They are usually due to the formation of a subdural abscess and with adequate care, particularly strict immobilization, they undergo a gradual regression with complete restoration to normal. The second group is that in which shortly after the onset of the disease, a complete paraplegia suddenly develops. This type is due to an edema and interference with the intrarhachidian blood supply. With adequate immobilization, the restoration occurs within a short time and the prognosis is excellent. The third type is that in which the onset of the paraplegia is due to a pachymeningitis. This is usually seen in cases that have been badly treated over a long time. The onset is gradual, the paraplegia seldom complete and the prognosis for cure bad.

LOCAL INJURY AS A CAUSATIVE FACTOR IN BONE SARCOMA WITH ESPECIAL REFERENCE TO THE MEDICO-LEGAL ASPECTS. William B. Coley, New York. *International Journal of Medicine and Surgery*, July, August, 1926.

From a careful analysis of cases of bone sarcoma, personally observed, and in which the question of antecedent local trauma has been carefully studied, for more than thirty years, Coley draws the following conclusions:

1. In sarcoma, especially in sarcoma of the long bones, there can be no longer the slightest question that a single local trauma in the form of a bruise, a sprain or a fracture, may be the direct exciting cause.

2. The percentage of cases in which it is fair to conclude that the antecedent trauma was an important causative factor is in the neighborhood of 50.

3. The interval between the injury and the first appearance of symptoms (pain) or physical signs (tumor) may vary from a few days to two years or more; yet in the great majority of cases the interval is less than six months, and in 50 per cent of the cases less than one month.

4. A rational and thoroughly scientific explanation of the causal relationship between trauma and a malignant tumor is possible if we assume that malignant tumors are due to some form of microorganism or virus.

5. From a medicolegal standpoint, in order to establish causal relationship between the injury and the development of the malignant tumor, the following conditions formulated by Segond should be fulfilled:

(a) The authenticity of the trauma.

(b) Sufficient importance or severity of the trauma.

(c) Reasonable evidence of the integrity of the part prior to the injury.

(d) Correspondence of the tumor to the site of the injury.

(e) A date of appearance of the tumor not too remote from the time of the accident to be reasonably associated with it.

(f) A diagnosis established by clinical and *x*-ray evidence, supported when possible by microscopical confirmation.

BOOK REVIEWS

A PRACTICAL MEDICAL DICTIONARY. By Thomas Lathrop Stedman, A.M., M.D., Editor of the "Twentieth Century Practice of Medicine" and of the "Reference Handbook of the Medical Sciences," etc. *Ninth Edition*. 8 vo. Pp. 1178; illustrated. Price, $7.50. New York: William Wood & Company, 1926.

We welcome each new edition of this excellent dictionary because it always represents a careful revision. Although the eighth edition appeared but two years ago, the ninth contains several hundred new titles and about thirty additional pages. Many changes have been made to conform it to the new editions of the United States Pharmacopoeia and the National Formulary. The plates that formerly appeared in an appendix are not distributed so as to face the title they illustrate. Added to the appendices that were in the last edition there is now a Table of Drugs, Their Doses and Uses. As before, the dictionary appears with flexible binding and thumb index.

DIE CHIRURGIE. Eine zusammenfassende darstellung der allgemeinen und der speziellen Chirurgie. Herausgegeben von Prof. Dr. M. Kirschner und Prof. Dr. O. Nordmann. *Lieferung* 2. *Volume* 5. DIE CHIRURGIE DES MASTDARMS UND DES AFTERS. Von Dr. R. Reichle, Stuttgart, und Prof. A. Tietze, Breslau. 8 vo. 160 Seiten; 77 Abbildungen und 7 farbigen Tafeln. Berlin und Wien: Urban und Schwarzenberg, 1926.

This section of Kirschner and Nordmann's "Surgery" is devoted to a consideration of the surgical affections of the colon and the rectum. Like all the other sections of this admirable surgical work it is monographic in character. There is an excellent discussion of the embryology, anatomy and phsyiology of these portions of the intestinal tract. The various surgical conditions are treated at length and with great clarity. The bibliographical references following the conclusion of each topic are well chosen and the illustrations are well selected and well reproduced. The work maintains in all respects the high standard set by the previous sections.

DIE CHIRURGIE. Eine zusammenfassende Darstellung der allgemeinen und der speziellen Chirurgie. Herausgegeben von Prof. Dr. M. Kirschner, Königsberg, und Prof. Dr. O. Nordmann, Berlin. *Lieferung* 8. DIE CHIRURGIE DES OHRES. Von Prof. Dr. A. Blohmke, Königsberg. 8 vo; 636 Seiten; 79 Abbildungen. Berlin und Wien: Urban & Schwarzenberg, 1926.

In this work is conveyed our present knowledge of the normal and diseased ear in a clear and scientific manner.

The first portion deals with the gross, microscopical and surgical anatomy of the auditory system. An appropriate résumé of the physiology of the ear and its functional examination in connection with the preceding anatomical parts serves as an excellent basis for the following clinical chapters. General diagnostic and symptomatological remarks introduce these.

In the clinical part of this work Blohmke deals with the pathology, symptomatology, diagnosis, and therapy, including operative technique, of the diseases of the ear, grouping them according to the three gross anatomical parts of the acoustic organ. A separate chapter is devoted to intracranial complications (pathology, diagnosis and therapy).

The elaborate illustrations are of great value in presenting the anatomical conditions as well as the operative technique.

BOOKS RECEIVED

A Textbook of Urology. By Oswald Swinney Lowsley A.B., M.D., F.A.C.S.; Director of the Department of Urology of the New York Hospital; Consulting Urologist to the Hospital for the Ruptured and Crippled, The New York Skin and Cancer Hospital, Peekskill Hospital, Monmouth Memorial Hospital, Spring Lake Hospital, Nassau County Hospital and King's Hospital; etc., and Thomas Joseph Kirwin, PH.C., B.S., M.A., M.D., Chief of Clinic of the Department of Urology and Adjunct Visiting Urologist, New York Hospital; Assistant in Urology, Cornell University Medical College; Assistant in Anatomy, Columbia University Medical College; etc. 8 vo. Pp. 669; 233 engravings and 13 plates. Price, $10. Philadelphia and New York: Lea & Febiger, 1926.

Malignant Disease of the Testicle. Its Pathology, Diagnosis, and Treatment. By Harold R. Dew, M.B., B.S. (Melbourne), F.R.C.S. (Eng.), F.A.C.S.; Honorary Surgeon to Out-patients, Melbourne Hospital; Late First Assistant, Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne. 8 vo. Pp. 168; 52 illustrations. Price, $7. New York: Paul B. Hoeber, Inc., 1926.

Manipulative Surgery. Principles and Practice. By A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.); Surgeon (with charge of out-patients), Seaman's (Dreadnought) Hospital, Greenwich; Joint Lecturer on Operative Surgery, London School of Clinical Medicine; Visiting Surgeon in Charge of Special Clinic, Ministry of Pensions Hospital, Orpington; etc. 8 vo. Pp. 168; 62 illustrations. New York: The MacMillan Company, 1926.

Modern Methods of Amputation. By Thomas G. Orr, A.B., M.D., F.A.C.S.; Professor of Surgery, University of Kansas. 8 vo. Pp. 117; 125 illustrations. St. Louis: The C. V. Mosby Company, 1926.

Surgery of Neoplastic Diseases by Electrothermic Methods. By George A. Wyeth, M.D. 8 vo. Pp. 298; 137 illustrations. Price, $7.50. New York: Paul B. Hoeber, Inc., 1926.

Electrothermic Methods in the Treatment of Neoplastic Diseases. Designed as a Practical Handbook of Surgical Electrotherapy for the Use of Practitioners and Students. By J. Douglas Morgan, B.A., M.D.; Instructor in Radiology, University of Pennsylvania Graduate School of Medicine, Philadelphia; Assistant Radiologist, Philadelphia General Hospital; etc. 12 mo. Pp. 172; 36 illustrations. Price, $2.50. Philadelphia: F. A. Davis Company, 1926.

Chirurgie Du Sympathique. Chirurgie du Tonus Musculaire. La Section des Rameaux Communicants. Par P. Wertheimer, Ancien chef de Clinique chirurgicale à la Faculté de Lyon, et A. Bonniot, Chirurgien des Hôpitaux de Grenoble.En-8. Pp. 134; 21 figures. Prix: 22 fr. Paris: Masson et Cie, 1926.

General Anesthesia. A Textbook for Students and Practitioners of the Art of Anesthesia. By James G. Poe, M.D.; Lecturer on General Anesthesia in the Medical and Dental Departments of Baylor University; Chief of Anesthesia Staff of Baylor Hospital, Dallas; Consulting Anesthetist to the Shrine Hospital for Crippled Children and Parkland Hospital of Dallas; etc. 8 vo. Pp. 150; illustrated. Dallas, Texas: Published by the Author, 1926.

Local Anesthesia in Otolaryngology and Rhinology. By James Joseph King, A.B., M.D., Assistant Surgeon in Otology, New York Eye and Ear Infirmary; Consulting Otolaryngologist to the French Hospital; Attending Laryngologist to the New York Hospital for the Ruptured and Crippled; Surgeon to the Tonsil Hospital, New York. 8 vo. Pp. 205; 21 illustrations. Price, $5. New York: Paul B. Hoeber, Inc., 1926.

Rational Gland Therapy for Women. Particularly in Relation to Menstruation. By I. Wanless Dickson, M.B., F.R.C.S., etc. 12 mo. Pp. 96. Price, $2. New York: Paul B. Hoeber, Inc., 1926.

Handbuch Der Biologischen Arbeitsmethoden. Von Geh. Med.-Rat Prof. Dr. Emil Abderhalden, Direktor des Physiogischen Institutes der Universität Halle a. d. Salle. *Abt.* IV, Angewandte Chemische und Physikalische Methoden, Teil 6, 2. Hälfte, Heft. 1. 8 vo. 140 Seiten; 8 Abbildungen. Preis, Mk 6.60. Berlin und Wien: Urban & Schwarzenberg, 1926.

Lehrbuch Der Physiologie. Von Emil Abderhalden, o.ö. Prof. und Direktor des physiologischen Institutes der Universität Halle a. S. III. *Teil.* Sinnesfunktionen. 8 vo. 650 Seiten; 304 Abbildungen und 20 meist mehrfarbigen Tafeln. Preis, Mk. 33. Berlin und Wien: Urban & Schwarzenberg, 1926.

Die Operative Technik Des Tierexperiments. Von H. F. O. Haberland, Dr. Med., A. O. Professor für Chirurgie an der Universität Köln. 8 vo. 336 Seiten; 300 Abbildungen. Preis, Reichsmark 28.50. Berlin: Julius Springer, 1926.

Physiotherapy. Theory and Clinical Application. By Harry Eaton Stewart, M.D., President-elect American Academy of Physiotherapy; Attending Specialist in Physiotherapy, U. S. Marine Hospitals, N. Y.; Director, New Haven School of Physiotherapy; etc. 8 vo. Pp. 351; 66 illustrations. Price, $7.50. New York: Paul B. Hoeber, Inc., 1925.

The Inflammatory and Toxic Diseases of Bone. A Textbook for Senior Students. By R. Lawford Knaggs, M.C. (Cantab.), F.R.C.S.; Consulting Surgeon to the Leeds General Infirmary; Member of the Court of Examiners of the Royal College of Surgeons, and additional External Examiner in the Universities of Manchester and Birmingham. 8 vo. Pp. 416; 197 illustrations. Price, $5.50. New York: William Wood and Company, 1926.

INJURIES OF THE WRIST. A Radiological Study. By the late Dr. Étienne Destot, Lyons. Translated by F. R. B. Atkinson, M.D.C.M., Edin. Univ. 8 vo. Pp. 176; 87 illustrations. Price, $6.00. New York: Paul B. Hoeber, Inc., 1926.

ORTHOPEDIC SURGERY. By W. A. Cochrane, M.B., CH.B., F.R.C.S.E., Assistant Surgeon, The Royal Infirmary, Edinburgh; Late Clinical Assistant, Orthopedic Department, Massachusetts General Hospital, Boston. 8 vo. Pp. 528; 504 illustrations. Price, $6.50. New York: William Wood & Company, 1926.

SURGERY OF CHILDHOOD. By John Fraser, M.C., M.D., CH.M., F.R.C.S.E., Regius Professor of Clinical Surgery in the University of Edinburgh; Consulting Surgeon to the Royal Hospital for Sick Children, Edinburgh. In Two Volumes. 8 vo. Pp. 1152; 598 illustrations. Price, $14.00. New York: William Wood & Company, 1926.

GOITER AND OTHER DISEASES OF THE THYROID GLAND. By Arnold S. Jackson, M.D. Large 8 vo. Pp. 401; 151 illustrations. Price, $10.00. New York: Paul B. Hoeber, Inc., 1926.

PLASTIC SURGERY OF THE HEAD, FACE AND NECK. By H. Lyons Hunt, M.D., L.R.C.S. (Edin.), L.R.C.P. (Edin.); Licentiate of the Faculty of Physicians and Surgeons of Glasgow; Late Captain, M.C., U.S.A.; Consulting Plastic Surgeon, Midtown Hospital and Lexington Hospital, New York City; etc. 8 vo. Pp. 404; 342 engravings and 10 colored plates. Price, $7.00. Philadelphia and New York: Lea & Febiger, 1926.

THE MODERN TREATMENT OF HEMORRHOIDS. By Joseph Franklin Montague, M.D., F.A.C.S., of the Rectal Clinic, University and Bellevue Hospital Medical College; Lecturer on Rectal Pathology; Fellow, American Proctologic Society; etc. 8 vo. Pp. 296; 116 illustrations. Philadelphia and London: J. B. Lippincott Company, 1926.

THE DUODENAL TUBE AND ITS POSSIBILITIES. By Max Einhorn, M.D., Professor of Medicine at the New York Postgraduate Medical School; Visiting Physician to the Lenox Hill Hospital, New York. *Second Edition*. 8 vo. Pp. 206; 126 illustrations. Price, $3.00. Philadelphia: F. A. Davis Company, 1926.

THE HUMAN CEREBROSPINAL FLUID. An Investigation of the Most Recent Advances, as Reported by The Association for Research in Nervous and Mental Diseases. Editorial Board: Charles L. Dana, M.D., Thomas K. Davis, M.D., Smith Ely Jelliffe, M.D., Henry Alsop Riley M.D., Frederick Tilney, M.D., Walter Timme, M.D. 8 vo. Pp. 568; 77 illustrations and 58 tables. Price, $10.00. New York: Paul B. Hoeber, Inc., 1926.

THE X-RAY IN EMBRYOLOGY AND OBSTETRICS. By W. A. Newman Dorland, A.M., M.D., F.A.C.S., Professor of Gynecology and Obstetrics and Head of the Department of Obstetrics in the Post-graduate Medical School of Chicago; etc., etc.; and Maximilian John Hubeny, M.D., F.A.C.R., F.A.C.P., Director of the Department of Radiology of the Physicians' and Surgeons' Institution; Consulting Radiologist to the Grant, Henrotin, and Policlinic Hospitals of Chicago; etc. 8 vo. Pp. 420; 259 illustrations. St. Paul: Bruce Publishing Company, 1926.

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by Hobart Amory Hare, M.D., LL.D., Professor of Therapeutics, Materia Medica and Diagnosis in the Jefferson Medical College, Philadelphia; Physician to the Jefferson Medical College Hospital; etc., assisted by Leighton F. Appleman, M.D., Instructor in Therapeutics, Jefferson Medical College., Philadelphia; Ophthalmologist to the Frederick Douglass Memorial Hospital and to the Burd School; Attending Surgeon to the Wills Eye Hospital. *Volume* III, *September*, 1926. 8 vol. Pp. 284. Philadelphia and New York: Lea & Febiger, 1926.